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Evolution, Terror Management Theory, and Humans' Relationship with Nature

Joshua Warren Vinocour
University of Missouri-St. Louis, joshuavinocour@yahoo.com

EVOLUTION, TERROR MANAGEMENT THEORY, AND HUMANS' RELATIONSHIP WITH NATURE

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JOSHUA VINOCOUR
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Advisory Committee

Brian Vandenberg, Ph.D.
Chairperson
Ann Steffen, Ph.D.
Committee Member
Matthew Taylor, Ph.D.
Committee Member
Allon Uhlman, Ph.D.
Committee Member

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Abstract

This study investigated the savannah hypothesis, an evolutionary explanation for human environmental preference. It aimed to address some of the methodological shortcomings of prior research while simultaneously investigating the role of non-evolutionary influences, such as existential anxiety and individual differences. Ninety-eight undergraduate participants were shown photos of Natural, Mixed, and Built settings and rated the visual attractiveness of each photo. Results showed that Built scenes were preferred over Natural and Mixed scenes, in contradiction to the savannah hypothesis. Existential anxiety, however, did not appear to influence photo ratings. Individual differences, such as ethnicity and the quality participants' previous outdoor experiences were significantly related to photo ratings. Caucasian participants and participants with a history of pleasurable outdoor experiences rated natural photos as more attractive than minority participants and participants who reported having more unpleasant outdoor experiences. The results undermine the savannah hypothesis' adaptationist claims regarding the human preference for natural scenes.

Keywords: savannah hypothesis, evolution, mortality salience, terror management theory, nature, environment

A Functional Evolutionary Account of Environmental Preference

The Human Preference for Nature

In 1969 Congress passed the National Environmental Policy Act requiring federal agencies to, "identify and develop methods and procedures…which will ensure that presently unquantified environmental amenities and values may be given appropriate consideration in decision making along with economic and technical considerations" (S. Res. 83, 1969) so as to assure, "productive and esthetically…pleasing surroundings (S. Res. 83, 1969). Suddenly, land managers were required to quantify, empirically, environmental characteristics valuable to "consumers". Thus began American scientific investigation into human preference for natural environments.

One of the most important and consistent findings of the approximately two decades of research that followed in Europe and North America was that humans report preferring natural environments to man-made environments (Ulrich, 1983). Aesthetic response is generally understood as preference or like-dislike affect associated with a visual encounter with the environment, often in the form of photographs or slides (Brown & Daniel, 1986; Hull, Buhyoff, & Daniel, 1984). The use of photographs as surrogates for actual natural scenes is a well-established method. In addition, a number of studies have demonstrated that the use of photographic representations of natural scenes is a valid tool for approximating humans' responses to and evaluations of the outdoors (e.g., Coughlin & Goldstein, 1970; Daniel & Boster, 1976; Dunn, 1975; Hull & Stewart, 1992; Kellomaki & Savolainen, 1984; Shafer & Richards, 1974; Zube, Pitt, & Anderson, 1974).

Studies have measured aesthetic response using a number of affect-laden descriptors including "preference", "scenic quality", "pleasantness", "beauty" and

"ugliness". Results from the different measures are highly correlated and appear not to differ significantly (Zube, Pitt, & Anderson, 1974). Several studies have shown that even unspectacular natural views elicit higher aesthetic preference or pleasantness than do most urban views (e.g., Bernaldez & Parra, 1976; Kaplan & Kaplan, 1989; Kaplan, Kaplan, & Wendt, 1972; Palmer, 1978; Wohlwill, 1976; Zube, Pitt, & Anderson, 1975). Occasionally, preference levels for the natural scenes are so much higher than the urban views that the distribution of scores for the two domains hardly overlap (Kaplan, Kaplan, & Wendt, 1972). This pattern emerged even in what was considered a relatively conservative test comparing aesthetic preferences for everyday rural scenes to "picturesque" Scandinavian townscapes (Ulrich, 1981). Several studies have also demonstrated that when natural elements, such as vegetation and water, are added to urban scenes, preference levels often rise significantly (e.g. Brush & Palmer, 1979; Herzog, Kaplan, & Kaplan, 1982; Thayer & Atwood, 1978). Similarly, the inclusion of human-made elements in predominantly natural scenes usually reduces preference significantly (Brush & Palmer, 1979; Clamp, 1976; Evans & Wood, 1980). Moreover, the gap in liking or pleasantness between natural and urban views cannot be explained by differences in other visual properties such as complexity or familiarity (Ulrich, 1983).

Such preference studies were often atheoretical and descriptive, intended primarily to give land managers and civic planners an empirical basis from which to make decisions about specific design characteristics (Arthur, 1977; Zube, Sell, & Taylor, 1982). Since then, however, investigators have attempted to explain why humans find photos of predominantly natural environments more aesthetically pleasing than predominantly human-made environments. The most widely cited explanation is based

in evolutionary theory and argues that such a preference is the result of adaptations that were advantageous to early humans. This, in turn, is based on evidence suggesting that emotional responses motivate adaptive behavior.

The Adaptive Value of Emotions

Proponents of an evolutionary explanation cite data from the cognitive and emotional literature which suggest that many affects are essentially precognitive and constitute the initial level of response to environment (e.g., Damasio, 1994; Ittelson, 1973; Izard, 1977; Zajonc, 1980). Emotion theorists argue that affective reactions need not depend on cognition and that the first stage of response to stimuli can consist of global, generalized affects related to preferences (e.g. liking or dislike) and approach-avoidance behavior (Ittelson, 1973; Izard, 1977; Zajonc, 1980). The onset of such reactions occurs quickly and is based on very little information. It has been argued that initial reactions in many instances speed recognition and sharply increase the efficiency of information processing (Ohman & Wiens, 2003; Zajonc, 1980). Indeed, there is evidence that like-dislike emotion in relation to a stimulus can be independent of recognition (Moreland & Zajonc, 1977; Wilson, 1979; Ohman & Mineka, 2001; Ohman & Soares, 1994). Zajonc (1980) speculates that some affects can occur with little information and without precise recognition because of a class of features and stimulus characteristics he calls “preferenda”. These are gross, often vague, configural aspects that may be insufficient as a basis for cognitive judgments but can be highly effective in eliciting affect. From the standpoint of survival requirements in evolution, quick-onset responses motivating approach-avoidance behaviors would have had great adaptive value.

One category of visual stimuli to which such automatic physio-affective responses is clearly adaptive is threatening natural objects and situations. It has been observed that fears and phobias do not occur to an arbitrary group of objects and situations but rather tend to be associated with "natural" objects and situations such as snakes, spiders, deep water, heights, depths, darkness, and blood (Agras, Sylvester, & Oliveau, 1969; Ohman & Wiens, 2003). Common to all these objects and situations is that they represent threats to humans. Accordingly, Seligman (1971) proposed that modern humans remain "biologically prepared" through natural selection to learn fears of natural objects and situations that threatened the survival of the human species during the course of evolution. The biological preparedness hypothesis has been supported by a large number of well-controlled laboratory studies (DeBecker, 1997; Ohman & Mineka, 2001). Together, the data provide strong evidence that fear of survival-relevant natural stimuli is driven by deeply rooted, evolved mechanisms.

The assumption is that an individual's affective reaction motivates or serves as an action impulse for adaptive functioning. The individual is physiologically mobilized to undertake or sustain adaptive actions because affects have produced appropriate changes in arousal (Damasio, 1994; Izard, Kagan, & Zajonc, 1984; Marks, 1987; Ohman & Wiens, 2003). The adaptive potential of fear and dislike, for example, is intuitively obvious – they facilitate defensive behaviors such as visual scanning, avoidance, and flight. When faced with a natural threat, such as a snake, a highly efficient avoidance / dislike reaction would be very adaptive (Marks, 1987; Ohman & Wiens, 2003). Conversely, liking, preference, and interest are intuitively linked to approach behaviors, exploration, and continued engagement with an activity. When confronted by an

inherently beneficial object or situation, a highly efficient approach / liking response would also be adaptive.

Indeed, human responses to the environment that are presumed to be affected by evolutionary forces are not limited to "biophobic" reactions. Examples of positive, adaptive ("biophilic") responses to various environmental stimuli abound. Our preference for fatty, sweet foods and our enjoyment of sex, for example, are adaptations that increase our inclusive fitness (Buss, 1999). Furthermore, when we see an attractive individual or smell cookies baking we do not stop to think that we are having an adaptive response that has been consistently associated with the continuation of the species. Rather we have a positive emotional reaction and find ourselves drawn to that person or those cookies, sometimes without conscious awareness (Wilson, 1998). Much like we would to a snake or a cliff, the argument goes, we rapidly and automatically respond to health- and survival-promoting stimuli in ways that increase the likelihood of our continued well-being.

Habitat Selection and the Savannah Hypothesis

Habitat selection, like biophobias and food selection, is another behavior, according to evolutionary psychologists, that is also influenced by evolutionary processes (Kaplan, 1987). Evolutionary psychologists argue that, because choice of habitat exerts a powerful influence on survival and reproductive success, the behavioral mechanisms involved have been under strong selection pressure (Buss, 1999; Woodcock, 1982). Furthermore, they argue that habitat selection involves emotional responses to key features of the environment and that it is these key features that induce the positive and negative feelings that lead to either settling or rejection (Orians, 1986). If the strength of

these responses is a key proximate factor in decisions about where to settle, then the ability of a habitat to evoke such emotional states should be positively associated with the expected survival and reproductive success of an organism in that habitat. In other words, good habitats, as measured by the features that contribute to survival and reproductive success, should evoke strong positive responses, while poorer habitats should evoke weaker or negative responses.

This is the underlying logic of the savannah hypothesis, which posits that the majority of human evolution took place in the savannahs of East Africa (Orians, 1980, 1986; Orians & Heerwagen, 1992). Moreover, it cites evidence that the savannahs of tropical Africa have high resource-providing potential for a large, terrestrial, omnivorous primate and are, therefore, of higher quality for early human existence than either wetter or drier habitats (Orians, 1986). In addition, it has been argued that the savannah offers more game for meat than do tropical forests, more vegetation for grazing, and open vistas conducive to a nomadic lifestyle (Orians, 1986). The savannah hypothesis argues that the human perceptual system is maximally adapted for the environments in which we spent the greater part of our evolutionary history. It has been argued that this fact alone could account for our preference for natural environments (Wohlwill, 1983). In addition, it suggests that specific natural elements and configurations (especially high-quality savannah-like elements and configurations) will be preferred over others because they signal a habitat with more resources and fewer threats. Towns and cities have existed but for a tiny fraction of humans' evolutionary history. Therefore, according to the savannah hypothesis, it is unlikely that humans have evolved the same kinds of physio-affective adaptations for human-made environments as they have for natural environments. Thus,

even a human-made setting that is, objectively speaking, very conducive to human life is unlikely to be perceived as more beautiful or pleasing than a natural environment that is similarly salubrious – humans simply lack a positive genetic memory for it.

The savannah hypothesis is often cited to help explain the empirical evidence demonstrating a strong preference for predominantly natural environments over human-made environments (e.g., Buss, 1999; Ulrich 1991; Wilson, 1998). Indeed, it is consistent with the observation that environments manipulated strictly or primarily for the pleasure they evoke are generally savannah-like (Orians, 1980). Orians (1985) studied the tree forms selected out of all forms available to Japanese gardeners and found that both selection and pruning practices favored the shapes characteristic of savannah species (e.g. Acacias). In addition, parks and gardens in most cultures are neither closed forests nor open grasslands (Turner, 2005). Moreover, great pains are taken in the creation of gardens and parks to include additional elements that also happen to be vital resources, such as water elements (Eisenberg, 1998). The savannah hypothesis is also consistent with a body of literature describing highly preferred features of natural environments. This research has demonstrated that people prefer environments that have water, large, healthy trees, a focal point, changes in elevation, semi-open spaces, even ground cover, distant views to the horizon, and moderate degrees of complexity (Ulrich, 1983). Proponents of functional evolutionary accounts of human aesthetic and environmental preference point out that most of these features figure prominently in typical savannah landscapes (Ulrich, 1983). They also posit that such features are evolutionarily relevant.

The evolutionary significance of water is obvious – it is necessary to sustain life. It is not surprising, therefore, that we respond positively to the presence of water. There is even some evidence to suggest that stagnant or turbid water is less preferred than clear, flowing water (Ribe, 1989; Zube, Pitt, & Anderson, 1974). The presence of large, healthy, green trees, it has been suggested, might have indicated to early humans that the environment was relatively stable and resource rich (Orians & Heerwagen, 1992). Preferred spatial characteristics, such as moderately open spaces, the presence of a focal point, and views to the horizon, have also been suggested to be beneficial. It has been argued that these characteristics allow for maximal visual penetration while also providing adequate refuge. This hypothesis corresponds closely to Appleton's (1975; 1988) prospect-refuge theory. He concluded, based on his study of paintings and photographs, that an unusually high number of highly preferred works of art use vantage points and elements that convey a sense of the ability to see without being seen. The evolutionary implications are clear – these characteristics would have allowed us to monitor a landscape for potential predators and at the same time provided sufficient cover so that we might hide or escape (Appleton, 1975).

Evidence for humans' innate and biologically-based preference for natural over built environments is bolstered by findings suggesting that individual and group differences are surpassed by universal predictors of preference. Initially, it was assumed that learning and culture was the main mechanism responsible for shaping responses to landscapes (e.g., Lyons, 1983; Tuan, 1971; Wohlwill, 1983). Thus, it was anticipated that studies would reveal great differences between groups and individuals as a function of such variables as rural versus urban background and culture. Although some studies

have reported statistically significant variations as a function of variables such as age (Zube, Pitt, & Evans, 1983), urban/rural background (Zube, Pitt, & Anderson, 1974), ethnicity (Yi, 1992), and personality traits such as sensation-seeking (van den Berg & ter Heijne, 2005; Zuckerman, Ulrich, & McLaughlin, 1993) and emotional self-regulation (Koole & van den Berg, 2005; Korpela, Hartig, Kaiser, & Fuhrer, 2001), these differences usually are small compared to the percentage of variance associated with group similarities. The conclusion supported by this research is that similarities in response to natural scenes outweigh the differences across individuals, groups, and a number of European, North American, and Asian cultures (Hull & Revell, 1989; Ulrich, 1993).

Although the majority of support for the savannah hypothesis is based in post-hoc analyses of correlational and observational research, there has also been some supportive experimental research. Orians and Heerwagen (1992) report evidence that diverse populations prefer tree structures that are indicative of high-quality savannah environments. In this study, subjects from Australia, Argentina, and the United States evaluated a series of photographs of trees taken in Kenya. Each photograph focused on a single tree and pictures were taken under standardized conditions such as in similar daylight and weather. The trees selected for inclusion in the study varied in four qualities – canopy shape, canopy density, trunk height, and branching pattern. Participants from all three cultures showed a strong preference for savannah-like trees – those forming a moderately dense canopy and trunks that separated in two near the ground. Participants also tended to dislike skimpy and dense canopies.

The savannah hypothesis is discussed here because it represents the most current and widespread explanation for the evidence provided by preference research, not necessarily because this proposal supports its adaptationist claims wholeheartedly. Indeed, in the methodological critique that follows, it is argued that certain methodological flaws within the preference research paradigm are what allow, in part, for interpretations that are consistent with evolutionary psychology, such as the savannah hypothesis. But there are broader criticisms, as well, that deserve mention, even if only briefly.

First, as was implied above, there is little hypothesis-driven research about the savannah hypothesis. Most evidence cited in support of evolutionary explanations is correlational and, even, observational. An extensive literature review at the time of this proposal found only two experimental studies, one of which has already been mentioned (i.e., Orians & Heerwagon, 1992). The other, Balling & Falk (1982), both supports and contradicts the savannah hypothesis. Using a cross-section of age groups, they found that only young children preferred photos of stereotypically savannah-like settings to other biomes (e.g., desert, deciduous forest, coniferous forest, and tropical rain forest). This effect disappeared in older participants, presumably because they had had more exposure to non-savannah-like environments and, perhaps, because they had had more opportunities to learn certain cultural notions that might mask "inherent" biological tendencies. In the absence of substantial experimental research, the savannah hypothesis must be considered speculative. Second, the supposed universality of preference for natural over human-influenced environments is not well-established. Though there have been some cross-cultural studies, they must be interpreted with caution because most of

them include relatively homogenous populations from Westernized and industrialized nations. Never has a truly diverse population, such as indigenous Amazonian or Papua New Guinean groups, been studied. In addition, the few studies that do not use European or North American samples tend to be less supportive and, at times, contradictory (e.g., Chokor & Mene (1992) [Nigerians]; Yi (1992) [South Koreans]; Hull & Revell (1989) [Balinese]).

The last and, perhaps, most serious criticisms of the savannah hypothesis are not specific to the savannah hypothesis but are levied against all adaptationist claims. Adaptationism, as described by Gould and Lewontin (1979), assumes, "the near omnipotence of natural selection in forging organic design and fashioning the best among possible worlds" (p.150). They continue that adaptationism, "regards natural selection as so powerful and the constraints upon it so few that direct production of adaptation through its operation becomes the primary cause of nearly all organic form, function, and behavior" (p.150-151). The savannah hypothesis is adaptationist in that it posits an evolutionarily-consistent explanation about the function of a proposed trait - preference for unthreatening natural environments. One of the criticisms of this approach is that it requires the atomization of traits, the reduction of function and behavior into discrete units, each independently influenced over time by natural selection (Gould & Lewontin, 1979). The problem with doing so, according to critics, is that organisms are and always have been absolutely integrated and any one thing, an anatomical feature, for example, is always a function of at least two interacting entities.

Another criticism is that adaptationist explanations do not lend themselves to testing and, thus, rejection. Gould and Lewontin (1979) noted that the rejection of one

adaptive story usually leads to its replacement by another adaptive story, rather than to a suspicion that a different kind of explanation might be required. "Since the range of adaptive stories is as wide as our minds are fertile," they observed, "new stories can always be postulated" (p. 153). There are indications that this phenomenon is already occurring in the field of environmental preference (e.g., Ulrich et al., 1991). Furthermore, adaptationist explanations often make the logical mistake that the current function of a trait or feature explains its emergence when, in fact, traits are often byproducts of a more primary evolutionary change (Gould, 2000; Gould & Lewontin, 1979).

It is beyond the scope of this paper to fully address the various criticisms of the adaptationist paradigm. It should be noted, however, that one of the most compelling arguments against adaptationism is that it frequently fails to adequately consider and incorporate the many other evolutionary processes that are not governed by natural selection (Gould, 2000). Numerous alternative mechanisms of genetic change have been identified and supported empirically and the consensus among evolutionary biologists is that natural selection cannot, by itself, account for the panoply of life on earth (Gould, 2000).

Methodological Limitations of Preference Research

Preference research has yielded consistency across methodologies and populations, criticisms of the savannah hypothesis notwithstanding. Still, there are a number of areas in which preference research might improve its methodology and, thereby, clarify its conclusions. First, the distinction between "natural" and "human-made" environments is not well-defined in preference research. The "natural" photos

used in preference studies are best described as predominantly natural. While such natural photos are dominated by nature, they often contain obvious human-made elements such as roads, pathways, buildings, and cultivated farmland. Though numerous studies have concluded that "natural" environments are highly preferred to "urban" environments (e.g., Ulrich, 1983), it is clear that "natural", as defined by the majority of environmental preference studies is, in fact, not a unitary concept but one consisting of subcategories that include different degrees of human influence (Purcell, Lamb, & Falchero, 1994).

In an oft-cited preference study, for example, Kaplan, Kaplan, and Wendt (1972) concluded that nature scenes were highly preferred to urban scenes. However, the "nature" category actually consisted of two subcategories – entirely natural scenes and scenes where some human-influenced features could be seen within a predominantly natural setting. The latter "consisted of …pictures taken in [an] arboretum (including [photos] showing unpaved roads and unpaved parking lot)" as well as slides of "a large cornfield with [a] fence in the foreground…and [photos with] an open grassy hill with a row of telephone poles" (p. 355). In another study, Palmer (1978) showed that photos "dominated by natural influences" were preferred to photos "dominated by human influence". Again, however, the natural category included obviously human-influenced scenes, such as cultivated farmland.

In Herzog, Kaplan, and Kaplan's (1982) study, students' preferences for five scenes were compared: student housing, academic buildings, modern apartment buildings and commercial buildings (the "Contemporary Life" category), downtown alleys and factories (the "Alley/Factory" category), trees and green grass with residential buildings

("Urban Nature"), "Unusual Architecture", and "Old Buildings". Results showed significant differences in preference between all categories and the most preferred category was Urban Nature. The authors conclude that natural elements in urban settings significantly increase their aesthetic value. However, the study is cited as yet another indication that nature is preferred to human-made settings (e.g. Ulrich, 1983). A more precise conclusion would be that the combination of a certain amount of natural and built elements was preferred to pictures with a different combination of those elements. A number of other preference studies have also used "natural" scenes that overlap considerably with human-made environments (e.g. Bernaldez & Parra, 1979 and Evans & Wood, 1980 [roadside environments]; Thayer & Atwood, 1978 [urban parks]; Ulrich, 1977 [golf courses and roadside environments], Ulrich, 1981 [reservoirs and canals], etc.). In fact, it is the exception, not the rule, that preference studies use purely natural settings as comparison groups. Thus, it is difficult to know whether humans prefer natural environments or the mixture of human-influenced and natural environments.

The overlap between natural and urban is all the more important in light of preference studies demonstrating that some urban elements appear to contribute significantly to preference for predominantly natural settings. Herzog (1984), for example, showed that photos of natural scenes with pathways (not roads) were as preferred as completely natural settings. He also showed that photos of natural scenes with pathways that were accentuated by rows of large trees alongside them, which were obviously planted, were significantly more preferred than completely natural photos. In another preference study, Chokor and Mene (1992) compared a number of different categories of scenes, including completely natural landscapes and natural landscapes with

obvious human influence. The two scenes most highly preferred by their Nigerian participants were human-influenced and included, "a well-planned…urban landscape characterized by low density high standard dwellings, ample shade trees, luxuriant plants, lawns, flowerbeds, good access roads, and a good measure of landscaping" and, "a planned core city landscape, medium density high quality modern buildings, good drainage, a range of housing facilities and…shade tress" (p.240). The third most preferred landscape was significantly less preferred than both the human-influenced scenes and consisted of, "a natural river…with the surrounding natural vegetation intact" (p.240), that is, a scene with no indication of human influence. Both studies allow for a more nuanced analysis of the relative contribution of man-made elements, a rarity in most preference research. Moreover, both showed that photos with signs of human influence can be as preferred as or more preferred than completely natural photos.

A second, perhaps more significant, methodological concern involves the selection of urban comparison groups. The nature photos selected in preference research tend to contain many of the most aesthetically appealing characteristics of natural environments according to empirical research, including water, large, healthy trees, a focal point, changes in elevation, semi-open spaces, even ground cover, distant views to the horizon, no obvious threats, and moderate degrees of complexity (Ribe, 1989; Ulrich, 1983; Zube, Pitt, & Anderson, 1975). In general, natural photos are systematically selected to include those that are most likely to elicit positive responses from viewers (Ulrich, 1986). These highly appealing natural scenes are then compared to urban scenes. However, there is no corresponding set of selection criteria for urban scenes. Whereas numerous studies have been devoted to ascertaining preferred natural elements, little

empirical research has been conducted to find preferred urban elements and configurations (Hildebrand, 1999; Nasar, 1988; Nohl, 1988). Consequently, there is no clear set of selection criteria for urban scenes. Ironically, preference studies often endeavor to select urban scenes they describe as "everyday" or "unremarkable" (Kaplan, Kaplan, & Wendt, 1972; Herzog, Kaplan, & Kaplan, 1982; Ulrich, 1979, 1981). Besides being a purely subjective determination, it constitutes an unbalanced comparison. The natural scenes, it has already been shown, are anything but everyday and unremarkable. They constitute a narrow range of all possible natural photos, a range that includes many of the most highly preferred natural elements. The comparison of natural photos known to be highly preferred to urban photos of unknown aesthetic value is likely to result in a preference for natural scenes because of the construction of the comparison, not because of the inherent properties of natural and urban scenes.

Furthermore, some urban scenes used in preference studies would appear to be less than unremarkable. Brush and Palmer (1979), for example, compared town and industry scenes to more natural scenes. The photos provided in the study depicted railway yards, factories, and strip mall parking lots – hardly attractive landscapes. In another study, Bernaldez and Parra (1979) found that natural photos were generally more preferred than human-influenced photos. However, many of the natural photos were selected from tourist books, which likely included highly aesthetically pleasing photos, whereas the human-influenced photos consisted of views of dams, stripped and excavated terrain, construction machinery, and some residential areas.

Even where data exists about preference for man-made elements, it is not incorporated into preference research. Wohlwill (1979), for example, has suggested that

the degree of "fittingness" or congruity between human-made elements and their natural surroundings is an important consideration with respect to preference. He defines fittingness as the sense of harmony or clashing between a human-made feature and their natural background. Several properties appear to influence whether a feature is evaluated as fitting. Low fittingness ("obtrusiveness") correlates highly with high color contrast between the feature and its surrounding, high textural contrast, size of the feature, and low congruity of shape (Wohlwill & Harris, 1980). In addition, Sorte (as cited in Ulrich, 1983) showed that fittingness and unity are usually greater when the feature is appraised as permanent rather than temporary. Unfortunately, this data is not taken into account by preference researchers.

The selection of what some might consider unattractive urban scenes and, even, unremarkable urban scenes is a curious one. Recall that evolutionary psychologists argue that humans prefer natural, savannah-type scenes because it is in these environments that we spent the greater part of our evolutionary history. According to proponents of the savannah hypothesis, natural selection has resulted in the development of an innate tendency to be automatically attracted to environments that promote our health and survival. Since we have spent but a tiny fraction of our evolutionary past in modern, built environments, so the logic goes, we have not adapted to them in the same way we have to completely natural surroundings (Orians & Heerwagen, 1992). Furthermore, a consensus has emerged regarding the specific natural elements that account for aesthetic preference (Ulrich, 1983). It follows from this rationale that any modern setting in which humans live ought to provide an adequate comparison to natural, savannah-type settings. This ought to include settings that might be considered attractive, not just unremarkable. It is

tempting to speculate about the potential biases underlying this methodological oversight. Is it possible, for example, that current romantic notions about the benefits of nature, prevalent since the emergence of nature worship toward the beginning of the 19th century in Europe (Schama, 1995), influenced researchers' selection of natural and urban scenes in such a way that those notions would be reinforced?

Regrettably, only two studies have deliberately used what they considered relatively attractive urban photos as a comparison group. The results of Ulrich's (1981) study were consistent with previous research and showed that predominantly natural scenes were preferred over more urban scenes; however, the sample was small (N=12), the urban scenes consisted of primarily commercial buildings, they did not appear especially attractive, and the "natural" photos contained some obvious human elements, such as cultivated fields. Ulrich's (1979) study was also consistent with previous research. It defined "attractive" urban scenes, however, as those lacking "litter, graffiti, and other blight" (p.17), a rather liberal interpretation of "attractiveness". This also suggests that the absence of these features is sometimes not a consideration for other researchers. In addition, its natural scenes also contained obvious signs of human influence.

In sum, the conclusion that nature is preferred is an oversimplification. The research suggests not that nature is preferred, but that a narrow subclass of non-threatening natural scenes is preferred to a wider variety of urban scenes. Furthermore, preference research has created liberal tests of the human preference for nature by comparing natural scenes that are likely to be considered especially attractive to urban

scenes that might or might not be considered attractive. The savannah hypothesis is based on these findings.

Terror Management Theory: An Alternative Approach

Evolutionary psychologists have made plausible arguments for the human preference for nature as well as for why we prefer specific visual elements. Recent work related to Terror Management Theory (TMT), however, suggests that there might be other important factors involved in human environmental preference. While TMT is grounded in evolutionary theory (Pyszcynski, Greenberg, & Solomon, 2003), its primary emphasis is socio-cultural, not biological. It assumes that humans' confrontations with existential realities (e.g. mortality) engender anxiety. It further suggests that the human capacity for meaning-making and culture buffer us against this anxiety and maintains psychological equanimity.

Overview of TMT

Terror Management Theory asserts that, in addition to empowering us with unparalleled adaptive potential, human beings' uniquely sophisticated cognitive capabilities lead to some unsettling realizations. Aware of our own existence, we can also recognize the inevitability of death. We know that we can perish at any time for reasons that cannot be predicted or controlled. Life can be snatched away by sudden encounters with tumors, tornados, or terrorists. All animals, including humans, have a biological proclivity for survival. Our awareness that death is always potentially imminent and ultimately inevitable, however, engenders a uniquely human capacity for experiencing potentially debilitating terror (Becker, 1973; Solomon et al., 2004).

According to TMT, humans cope with that potentially debilitating terror by employing the same cognitive capacities of abstract and symbolic thought that contribute to the awareness of death (Greenberg, Simon, Pyszczynski, Solomon, & Chatel, 1992). Specifically, TMT argues that humans develop and maintain a solution to the problem of death through culture and putting faith in cultural worldviews. Cultural worldviews are beliefs about the nature of reality shared by groups that provide answers to basic and universal cosmological questions and that structure human perception in ways that imbue the universe with meaning, order, and permanence (Harmon-Jones et al., 1997). Culture offers prescriptions for valued behavior that, when fulfilled, provide a sense of personal value and self-esteem. Culture also promises protection and ultimately death transcendence, either literally through beliefs such as heaven or reincarnation, or symbolically by enduring accomplishments, children, monuments, legacies, and so forth. According to TMT, individuals do not attain a sense of death transcendence simply by believing in cultural worldviews; they must first meet the standards of value prescribed by their worldviews (Greenberg et al., 1993). In other words, individuals must perceive themselves as valuable and significant participants in the cultural drama to which they contribute in order to qualify for the security-providing sense of death transcendence.

The research paradigm traditionally employed in terror management research consists of reminding participants about the inevitability of their own death followed by some measure of the strength of the association between individuals and their cultural worldview. By making mortality salient to participants, terror management research hopes to elicit psychological defenses against anxiety that the death reminder engendered. These psychological defenses can take many forms but, according to TMT, the end result

is generally the same - to strengthen one's faith in beliefs that provide value and meaning for one's life. Terror Management Theory has been validated by more than 200 studies demonstrating that cultural worldview is an important aspect of our defense against death anxiety (Arndt, Cook, & Routledge, 2004).

TMT and the Natural World

There is reason to believe that terror management concerns impact our relationship to the natural world and to nature. Some TMT research pertains directly to the human relationship with the natural world. This research is based largely on the assertion that humans' relationship with nature is a highly ambivalent one (Becker, 1973; Koole & van den Berg, 2005). According to Becker, "all systematizations of culture have in the end the same goal: to raise men above nature, to assure them that in some ways their lives count in the universe more than merely physical things count" (1973, p.4). It follows that we are, to some extent, both repelled by nature and drawn toward culture. Consistent with this hypothesis, TMT asserts that humans engage in a wide variety of behaviors that serve, in part, to deny or minimize our animal nature in order to protect us against death anxiety. The human body, for example, is problematic because it is a constant reminder of the inevitability of death (Goldenberg, Pyszczynski, Greenberg, & Solomon, 2000). We imbue bodies with abstract symbolic meaning in order to help cope with this difficulty. Bodybuilding, fashion, plastic surgery, tattoos, and piercings, it can be argued, are all things we do to elevate our bodies above the pieces of meat that they are to objects of beauty, dignity, and spirituality. Indeed, Goldenberg et al. (2000) used the standard research paradigm and found that reminding people of their mortality increased their need to distance themselves from animals in two studies. In Study 1

reminders of death led to an increased emotional reaction of disgust to body products and animals. Study 2 showed that, compared to a control condition, mortality salience led to greater preference for an essay describing people as distinct from animals.

Nature might also disturb our sense of equanimity to the extent that it reminds us of the fragility and shortness of life. Nature is replete with such reminders. Even a casual observer during a walk through an unremarkable natural area will notice a variety of plants and animals in various stages of life – birth and death, growth and decay, health and sickness. Together, all these experiences and observations might level the zoological playing field, so to speak, highlighting our similarities to other living things, not our differences. In short, being in nature undermines our sense of transcendence of it, laying bare a frightening reality that is usually obfuscated by a cultural veil. Facing overwhelmingly powerful and utterly impersonal natural forces and stripped of many of our cultural trappings, as we often are in nature, perhaps we find it more difficult to maintain faith in protective cultural worldviews and to achieve the equanimity to which Solomon et al. (1991) referred. For these reasons, it is possible that nature activates death-related thoughts and stimulates terror management defenses.

Several studies have dealt explicitly with this possibility and investigated the relationship between nature (flora, not fauna) and fear of death. Koole and van den Berg (2005, Study 1) asked their Norwegian participants to report how often they were inclined to think about various topics (e.g., freedom, death, romantic relationships, etc.) when they were in a wilderness environment relative to when they were in cultivated nature or in the city. Wilderness was defined as "nature that has been hardly influenced by humans, such as an impenetrable forest, a primeval swamp, or a rain forest" (p.1017).

Cultivated nature was defined as "nature that has been strongly influenced by humans, such as meadow, polders (i.e., drained marshlands), or grain fields" (p.1017). The city was described as "an environment in which nature played almost no role, such as the downtown area of a large city, highways, or industrial areas" (p.1017).

Results from Koole and van den Berg's study (2005, Study 1) indicated that participants were, in fact, significantly more inclined to think of death in the wilderness than in cultivated nature. Participants also reported being much more likely to think about freedom in wilderness compared to cultivated nature and the city. Moreover, cultivated nature was associated more with thoughts of freedom than the city. Thus, cultivated nature appeared to be psychologically midway between wilderness and the city. Overall, this study provides preliminary support for the hypothesis that confrontations with wilderness trigger deep existential concerns and, in particular, thoughts of death.

It is unclear from this study, however, whether wilderness inspires thoughts about death or whether thoughts about death lead people to seek out wilderness. Moreover, according to TMT's theoretical basis, the link between wilderness and death should not just be apparent in people's self-reports but should also operate on more implicit levels. To clarify these issues, an additional study used the classic Stroop paradigm to document the link between wilderness and death. In this study (Koole, 2003, as cited by Koole & van den Berg, 2004), different types of nature were primed by exposing participants to color photographs of natural landscapes, which were rapidly flashed on a computer screen. For one half of the participants the photos consisted of cultivated landscapes; the other half was primed with photos of wild landscapes. Following the priming task,

participants were asked to name the color of red and blue words that appeared on the center of the computer screen, an adaptation of the Stroop task. Some words in the Stroop task were related to death (e.g., corpse and grave). The remaining words were unrelated to death but negatively valenced (e.g., punishment and deceit), positively valenced (e.g., reward and love), or related to positive aspects of nature (e.g., flowers and birds). In this task, heightened accessibility of death thoughts was indicated by slower color-naming latencies for death words relative to the color-naming latencies of the other word categories. It was hypothesized that the wilderness prime would lead to relatively slower color naming latencies of death words whereas the cultivated prime would not elicit this effect. This pattern was indeed obtained. Thus, wilderness can prime thoughts about death and this link is even potent on implicit levels.

Given that wilderness can trigger thoughts of death, it follows that terror management concerns might influence people's attitudes toward wilderness. Specifically, mortality salience might lead people to respond less favorably to wilderness and more favorably to cultivated scenes. To test this hypothesis, Koole and van den Berg (2005, Study 2) examined the effects of verbal death reminders on aesthetic evaluations of nature. The landscapes used in this study consisted of verbal descriptions of landscapes that varied in degree of cultivation. Approximately half the descriptions referred to cultivated landscapes and half to wild natural landscapes. Examples of cultivated landscapes used in this study are "a large-scale landscape with fields, straight ditches, and straight roads" and "a planted forest with rows of thin trees and straight roads" (p.1018). Examples of wild landscapes are "an impenetrable swamp forest, thick overgrowth, wet grounds, much plant covering" and "a dune landscape with a view over

the sea, hilly, hard low bushes, sand" (p.1019). Results indicated that participants who were reminded of death rated cultivated landscapes as more beautiful than participants who were not reminded of death. Similarly, participants who were reminded of death rated wild landscapes as less beautiful than participants who were not reminded of death. A notable finding of this study was that the effects of cultivation were not influenced by differences in perceived openness, safety, or familiarity between wild and cultivated landscapes. These findings support the notion that terror management concerns sensitize people to the threatening aspects of wilderness. Further, the data are consistent with the hypothesis that, with respect to existential concerns, viewing cultivated nature is psychologically protective relative to wilderness.

It appears, then, that both socio-cultural / existential factors and more obviously biological factors (i.e., those implicated by the savannah hypothesis) may be closely related to humans' relationships with nature and environmental preference. Each approach offers an explanation that, to some extent, however, contradicts the other. The savannah hypothesis suggests that humans will universally prefer natural, savannah-type environments over more built environments, whereas TMT suggests that there are certain conditions under which humans will prefer more cultivated environments. The question is to what extent and under what conditions do the different mechanisms operate?

Although preference studies suggest that predominantly natural environments are preferred to relatively built environments, they do not constitute appropriate tests of the potential contribution of socio-cultural and existential concerns on human environmental preference. Environmental preference studies do not manipulate mortality salience. Recall that Terror Management research, in contrast, uses subtle reminders of one's

mortality to elicit non-conscious psychological defenses against death anxiety. Existential concerns were not explicitly stimulated in traditional preference research and, consequently, it is not likely that terror management strategies were employed by participants. This, in turn, reduces the likelihood that a preference for cultivated or otherwise human-made elements would be detectable. This important methodological difference between the two research paradigms is, by itself, sufficient reason to replicate preference studies using a mortality salient condition. It should be noted that, according to proponents of the savannah hypothesis, there is no reason to believe that the introduction of a subtle death reminder would alter the outcome of a preference study. They would argue that there is no connection between a death reminder and the innate psycho-physiological predisposition to respond in a certain way to specific visual configurations. If anything, proponents of the savannah hypothesis might predict an intensification of the preference for natural over human-made environments when confronted with a reminder of one's mortality. After all, there is hardly a more evolutionarily relevant stimulus than death itself.

Similarly, the terror management research paradigm does not constitute an appropriate test of evolutionary factors. The terror management research described above, unlike preference research, does not use savannah-like natural environments as comparison groups. Rather, it uses only cultivated and wild scenes. Thus, it lacks a crucial comparison category according to proponents of the savannah hypothesis.

A Methodological and Theoretical Synthesis

This study aimed to address some of the methodological shortcomings of preference research while simultaneously constructing an adequate test of the relative contribution of existential concerns on environmental preference. The basic research paradigm of the study resembled preference studies in that it involved rating aesthetic preference for a variety of natural and human-influenced photos. However, the present study deviated from this research in a number of important ways.

First, the content of its photos was significantly different. Unlike many previous preference studies, this study distinguished clearly between natural and human-influenced scenes. That is, the natural, savannah-like scenes used in this study contained no indications of human-influence. They were exclusively natural. Thus, it was hoped that the present study would help clarify whether the supposed human preference for natural environments is, indeed, a preference for natural environments rather than a preference for a mixture of natural and human-influenced environments. In addition, the study aimed to correct the bias inherent in most preference research by selecting human-influenced scenes that conveyed a sense of safety, timelessness, comfort, and belongingness and that were, therefore, more likely to be considered attractive. This was intended to create a more balanced and valid comparison between natural and human-influenced scenes. Human-influenced scenes, moreover, consisted of two separate categories of photos – predominantly human-influenced, or Built, scenes and intermediately human-influenced, or Mixed, scenes. Built scenes were made up predominantly of human-made elements with few natural features, whereas Mixed photos

were predominantly natural and savannah-like but with one or two human-made elements, such as a building or pathway.

The second way in which the present study deviated from traditional preference research was its integration of terror management research methodology. Specifically, this study explored the role of existential factors by including a mortality salience condition. Unlike other preference studies, approximately half of the participants were exposed to a death reminder, thereby stimulating existential concerns and related defense mechanisms, whereas the other half were exposed to a non-mortality salient control condition. By comparing participants' preference ratings in mortality salient and non-mortality salient conditions, the present study hoped to elucidate the potential contribution of existential concerns on environmental preference.

Hypothesis

The savannah hypothesis predicts that individuals will prefer Natural, "savannah-like" scenes to those that contain elements of human influence and, of those, that there would have been a preference for Mixed, savannah-like scenes that contain evidence of slight human influence over predominantly human-influenced, or Built, scenes (see Figure 1). There is no reason to expect that this order of preference will be influenced by a mortality prime.

Terror Management Theory, in contrast, predicts very different outcomes. First, it is expected that mortality salience will prompt preference for scenes of human influence – Built being most preferred, Mixed less so, and Natural scenes the least preferred. This is the opposite of the predictions consistent with the savannah hypothesis. Second, TMT

predicts that for control individuals who do not receive a mortality prime, there is no reason to expect a significant difference between the three types of scenes. Thus, an interaction effect between mortality salient and control participants is expected in the present study (see Figure 2). This study aims to provide a critical test of the prediction of two approaches and it is expected that the results will support TMT.

Figure 1. The savannah hypothesis' predicted relationship between mortality salience and photo category preference.

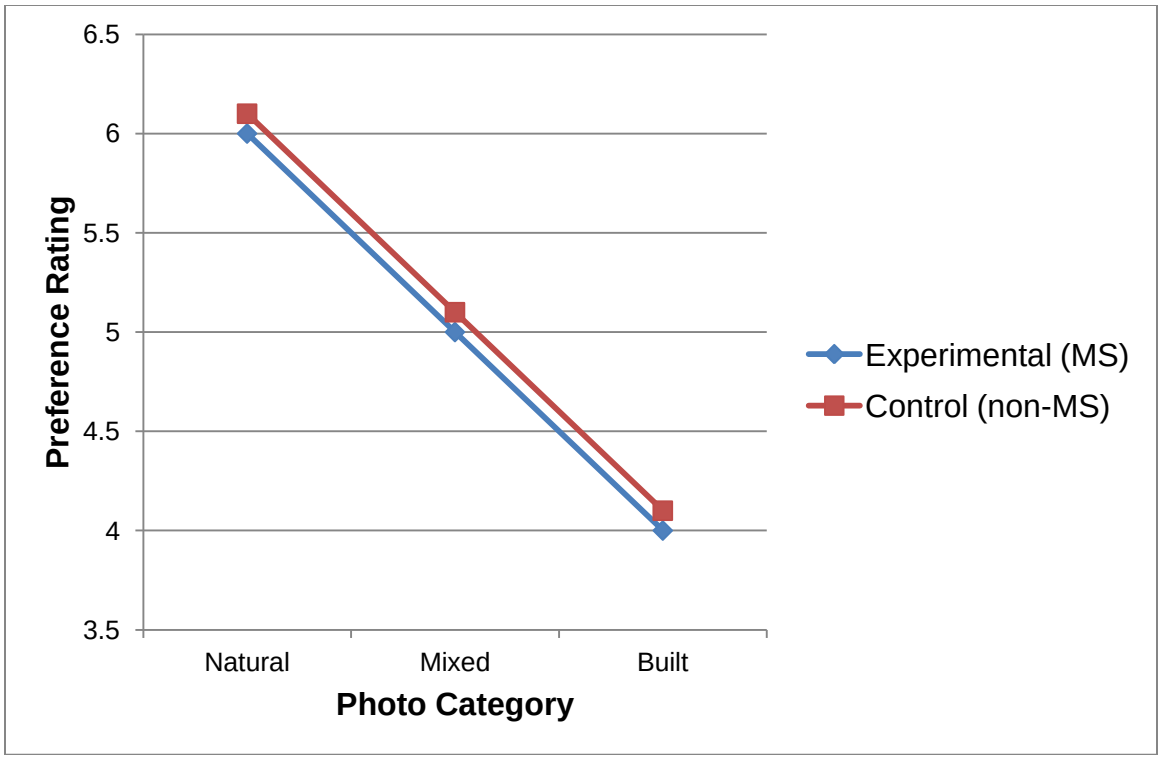
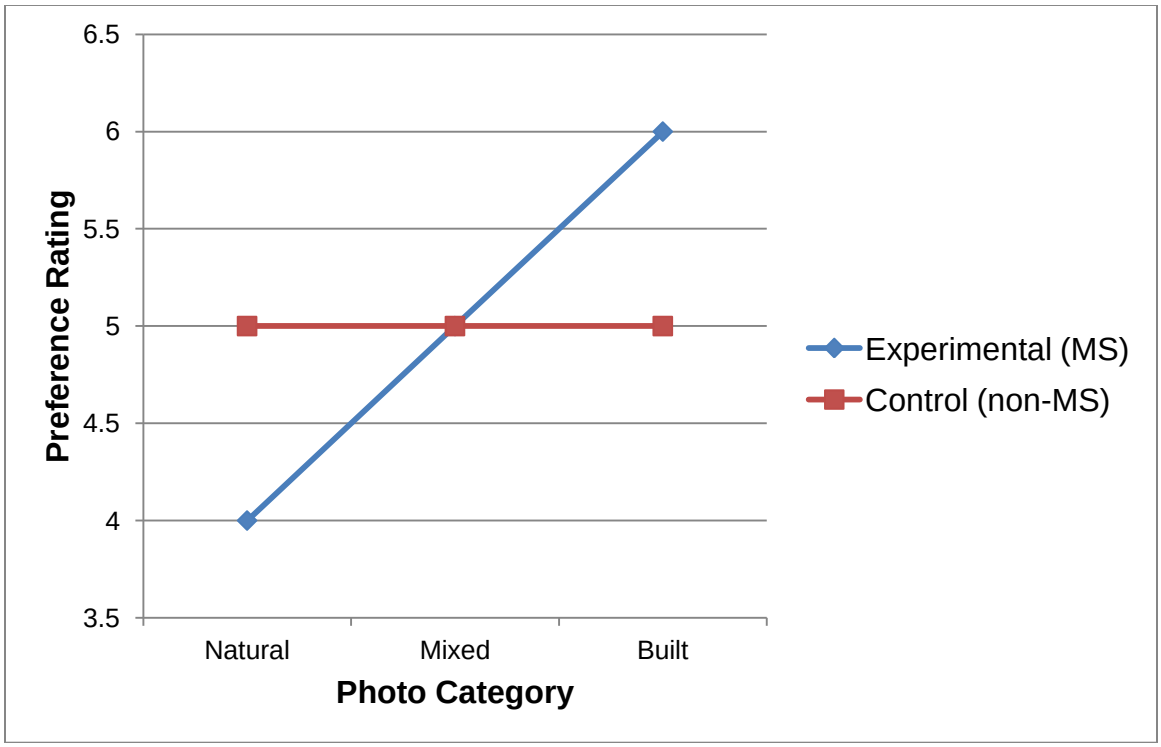


Figure 2. Terror Management Theory's predicated relationship between mortality salience and photo category preference.



Methods

Participants

Ninety-eight subjects were drawn from a pool of undergraduate psychology students at the University of Missouri – St. Louis. Students received course credit for their participation.

The sample consisted of 22 men and 76 women. The mean age of participants was 22.8 years (*SD* = 7.5) and ranged from 18 to 58 years. Fifty-six percent self-identified as Caucasian, 25% as African American, 11% as Asian or Asian American, 1% as Latino / Latina, 1% as Native American / Pacific Islander, and 6% as Other. Forty-four percent of participants reported growing up primarily in a suburban area, 37% reported growing up in an urban area, 11% reported growing up in a small town, and 5% reported growing up in a rural area. Eight percent reported never participating in outdoor activities (such as camping), 24% reported participating once or twice in their life, 9% reported participating less than once a year but more than once or twice, 7% approximately once each year, 27% two to three times a year, 11% approximately every other month, and 12% once a month or more. One percent of participants reported that such outdoor activities are terrifying, very uncomfortable or extremely unpleasant, 7% reported that they are mildly scary, uncomfortable or unpleasant, 16% reported that they experience an equal amount of positive and negative feelings, 43% reported that outdoor activities are enjoyable and pleasant, and 32% reported that they find these activities to be exciting, fulfilling, and satisfying. The mean score on the Sensation Seeking Scale was 16.9 (SD = 5.9) and ranged from 0 to 28.

Measures

Demographic. This paper and pencil measure consisted of demographic questions about age, sex, ethnicity, and income.

Mortality Salience or Control. The mortality salience manipulation consisted of two open-ended questions in which participants were asked to 1) "Please briefly describe the emotions that the thought of your own death arouses in you" and 2) "What do you think happens to you as you physically die and once you are physically dead?". The control condition consisted of two parallel questions: 1) "Please briefly describe the emotions that the thought of watching television arouses in you" and 2) "What do you think happens to you, physically, as you watch TV and once you are physically watching it"? Forty-six participants received the mortality salience version of the measure and 52 received the control version. These experimental manipulation and control conditions are identical to ones commonly used in terror management research (e.g. Greenberg et al., 1990, 1994, 1995; Florian, Mikulincer, & Hirschberger, 2002; Heine, Harihara, & Niiya, 2002; McGregor et al., 1998; Rosenblatt et al. 1989).

Distraction. Previous terror management studies have shown that mortality salience effects on cultural worldview defenses occur after people have been distracted from death reminders (Arndt, Greenberg, & Cook, 2002; Pyszczynski, Greenberg, & Solomon, 1999). Thus, the present study used the same distraction questionnaire used in previous terror management research (e.g., Rosenblatt et al., 1989). This questionnaire consisted of approximately 80 true / false questions similar in content to the Marlowe-Crowne Social Desirability Scale (MCSDS, Crowne & Marlowe, [1960]) and the Minnesota Multiphasic Personality Inventory, Second Edition (MMPI-II, Butcher, Dahlstrom, Graham, Tellegen, & Kaemmer, [1989]).

Visual Stimuli. This study utilized three photo categories – Natural, Mixed, and Built. Each category contained 30 photos. The Built photos were selected in a two-stage process. First, a set of photos from the photo-sharing internet site, www.flickr.com, was selected by the primary investigator. These photos consisted of scenes of residential and commercial townscapes. Though some of the photos contained natural elements, such as vegetation and water, they were dominated by human-made features such as buildings, streets, and alleys. Moreover, the Built photos were relatively neat and clean and did not contain indications of blight, damage, or decay. Photos containing people and cars were excluded. Efforts were made to select photos that were similar in scope, perspective, depth, and overall photographic quality. Second, a group of three independent raters selected a smaller group of photos from the original set. The independent raters were instructed to select any photos from the group that conveyed a sense of safety and comfort, that were non-threatening, and that did not contain advertisements, cars, people, blight, or decay. Moreover, they were instructed to select photos of a human scale, that is, photos of relatively small to medium-sized buildings, not large, multistory apartment complexes and office buildings. Furthermore, they were instructed to select photos that conveyed a sense of permanence and stability. Written guidelines were provided to each of the independent raters during their selection. All 30 Built photos were selected as meeting criteria by each of the three raters.

A similar procedure was used to select Natural photos. A sample of natural scenes that were consistent with the savannah hypothesis was also selected from the photo-sharing website, www.flickr.com, by the primary investigator. Attempts were made to choose entirely natural scenes that were consistent with the kinds of scenes

commonly used in preference research. These scenes were unspectacular and non-threatening. Again, efforts were made to select photos that were similar in scope, perspective, depth, and overall photographic quality. Second, the same three independent raters were used to select a smaller group of Natural photos from the original set of natural photos. Raters were instructed to select photos that had the most desirable and attractive features according to the savannah hypothesis, that is, photos that did not contain indications of human influence, that were non-threatening, and that contained water, large, healthy trees, a focal point, changes in elevation, semi-open spaces, even ground cover, and distant views to the horizon. Written guidelines were provided to each of the independent raters during their selection. Forty-six of these photos were selected as meeting criteria by each of the three raters. Fourteen photos were selected as meeting criteria by two out of three raters. This resulted in a group of 60 Natural photos.

Each Mixed photo was derived from a Natural photo. The only way in which they differed was the inclusion of an indication of human influence. Thus, mixed photos were very similar to Natural photos and they contained all the same most highly preferred visual elements of natural environments. One or two human-made elements, such as a building, fence, or pathway, were digitally added to Natural photos using digital image editing software to create Mixed photos. Efforts were made to ensure that the images were realistic and did not appear edited. Moreover, attempts were made to select human-made elements that were unobtrusive, that conveyed a sense of permanence, and that were congruent with their surroundings (in accordance with Wohlwill's [1979] findings). Every Natural photo was edited to create a corresponding Mixed photo. This resulted in a total of 60 Mixed photos.

Mixed photos were created from Natural photos in order to control for the effects of human influence. By essentially holding all other visual elements constant between Mixed and Natural photos (e.g., color, quality, scope, depth, specific natural elements, etc.), it was hoped that any subsequent difference in preference scores could only be attributed to the added elements. However, this created another problem. If participants were shown both an original photo (Natural) and its edited version (Mixed), they would probably recognize the repetition, creating a demand characteristic. Thus, two photo sets were created (Photo Set I and Photo Set II) such that no photo set contained both an original Natural photo and its edited Mixed version. Since there were 60 Natural and 60 Mixed photos, it was possible to create two sets with 30 Natural and 30 Mixed photos each that did not repeat and did not contain different versions of the same photo. While Photo Set I and Photo Set II contained different Natural and Mixed photos, they both contained exactly the same Built photos. For example, if Photo Set I contained Built photo 1, Natural photo 2 and Mixed photo 3, Photo Set II contained Built photo 1, Mixed photo 2 and Natural photo 3. The two photo sets were counterbalanced so that approximately the same number of control and experimental participants saw each set. The order of the photos was randomized and the same order was used for both Photo Set I and Photo Set II.

All photos were shown to participants using a 15.4 inch WSXGA+ LCD Panel color monitor of a Dell Inspiron 6000 laptop computer. Though the photos were programmed to advance automatically every eight seconds, participants could manually advance the photos at will. Almost all participants chose to manually advance the photos before the eight seconds elapsed.

Preference. Photographic preference was measured in much the same way as in previous environmental preference studies. The majority of preference studies rely on verbal measures of preference or liking and use a Likert scale (e.g., Daniel & Vinning,1983; Hull & Buhyoff, 1984; Zube, Pitt & Anderson, 1974). Participants in the present study rated their aesthetic preference for each photograph on a nine-point (zero midpoint) Likert scale. Specifically, participants were asked to, "Circle '+4' if the environment is one of the most beautiful and attractive environments you have ever seen. Circle '-4' if the environment is one of the ugliest, most repulsive environments you have ever seen".

Sensation Seeking. Sensation seeking was measured using Zuckerman, Eysenck, and Eysenck's (1978) Sensation Seeking Scale – V (SSS-V) (For purposes of this study, the measure was referred to as an "Interests and Preferences" questionnaire. The SSS-V is a 40-item paper-and-pencil questionnaire offering a Total Score as well as four subscale scores (Thrill and Adventure Seeking [TAS], Experience Seeking [ES], Disinhibition [Dis] and Boredom Susceptibility [BS]). The SSS-V is an externally valid and reliable measure, with subscale alpha's ranging from .65 to .82, and a Total Score internal reliability of .86 (Zuckerman, 1994, 2007).

Home Environment. An informal measure of participants' exposure to outdoor environments, as well as the frequency and degree of liking of outdoor experiences (e.g., hiking), was given in order to help determine what, if any, influence these factors have on participants' preference ratings. This paper-and-pencil measure consisted of four items. Participants were asked to identify the category of setting in which they spent the majority of their life – rural, small town, suburban or urban/city – as well as to identify

the category of setting in which they would most want to live in the future (rural, small town, suburban, and urban/city). They were then asked to rate the frequency with which they participate in outdoor recreational activities on an seven-point scale ranging from "never" to "more than once a month". They rated how enjoyable the activities are on a five-point scale ranging from "terrifying, very uncomfortable and/or extremely unpleasant" to "I find these activities to be exciting and/or very fulfilling and satisfying".

Procedure

Participants were run one at a time by the primary investigator and were randomly assigned to one of four groups - Mortality Salient (Photo Set I or II) or Control (Photo Set I or II). As in most terror management studies, the true purpose of the experimental manipulation was not explained as doing so could have created demand characteristics that would have undermined the validity of the study. Instead, the purpose of the study described as research designed to learn about what types of outdoor scenes people find most attractive and why. After obtaining consent, participants completed the Demographic questionnaire, followed by either the Mortality Salient or Control questions, followed by the Distraction questionnaire. Participants were then shown the 90 photos (30 Natural, 30 Mixed, and 30 Built – in the same random order for each participant) and rated their preference for each one using the Preference measure. Following the preference ratings, participants completed the Interests and Preferences questionnaire (i.e., the Sensation Seeking Scale – V) and the Home Environment questionnaire. After completing all measures, participants met with the investigator and were verbally asked for their impressions of the photos and, specifically, what they found attractive. They were then asked to describe the purpose of the study and debriefed.

None of the participants correctly identified the true purpose of the study. Individual lab sessions lasted approximately 45 to 60 minutes.

Power Analysis

Unfortunately, very few researchers have assessed the effects of mortality salience on environmental preference and those that have have not included the information necessary to calculate effect size. However, a review of similar analyses used in Terror Management studies showed that mortality salience consistently results in small to medium effect sizes, as defined by Cohen (2003) (i.e., Partial $\eta^2 \approx .10$ - .25). Assuming a medium effect size, the total number of participants needed to achieve 80% power was 42 (Faul, Erdfelder, Lang, & Buchner, 2007). This study included 46 participants in the mortality salient condition and 52 participants in the control condition for a total of 98 participants, more than twice the minimum estimated total needed to achieve 80% power.

Results

Preliminary Analyses

Randomization check.

Multiple analyses were performed in order to determine if the control and experimental groups differed significantly with respect to important demographic variables, including age, gender, ethnicity, home environment, and sensation seeking. An independent samples t-test showed that the mean age of the two groups did not differ significantly ($t[94] = .54$, $p = .59$). Males and females were also approximately evenly

distributed between the two conditions (Pearson's $\chi^2 = 0.25$, df = 1, p = .87). Similarly, Caucasian and non-Caucasian participants were approximately evenly distributed between control and experimental conditions (Pearson's $\chi^2 = 0.11$, df = 1, p = .74). Additional Chi Square analyses showed that participants from each home environment (i.e., rural, small town, suburban, urban/city) are evenly represented in both conditions (Pearson's $\chi^2 = 1.79$, df = 2, p = .41; Pearson's $\chi^2 = 0.38$, df = 2, p = .83; Pearson's $\chi^2 = 1.60$, df = 2, p = .45; and, Pearson's $\chi^2 = 0.81$, df = 2, p = .67, respectively). Lastly, there was no significant difference between control and experimental participants' mean sensation seeking score (t[96] = .45, p = .65).

Manipulation check.

A review of participants' written responses to the Control and Mortality Salience questionnaires revealed that each participant answered their respective questions and that their responses were relevant. Furthermore, no participants in the Control condition wrote about death- or violence-related themes. Thus, it is unlikely that any control participants were reminded of their mortality and it is likely that all experimental participants were.

Examination of potential interactions.

Several tests were performed in order to check for the influence of design and demographic variables on the photo ratings. First, an analysis was performed to determine whether there were differences in preference ratings between the two counterbalanced photo sets. A 2(Photo Set) X 2(Experimental Condition) X 3(Photo Category) repeated measures ANOVA yielded no significant effect for Photo Set, F(2, 110.14) = .35, p = .59, Partial $\eta^2 < .01$, Observed Power = .09. As participants'

preference ratings did not appear to differ systematically based on which photo set they saw, Photo Set was not included as a covariate in the main analysis.

Regarding participant sex, a 2(Sex) X 2(Experimental Condition) X 3(Photo Category) repeated measures ANOVA yielded no significant effect for sex, $F(2, 105.77) = 1.81$, $p = .18$, Partial $\eta^2 = .02$, Observed Power = .29. On average, men and women did not respond significantly differently to the photos; therefore, sex was not included as a covariate in the main analysis.

To investigate whether there were any effects due to family income, the original six income categories (0-20K, 21-40K, 41-60K, 61-80K, 81-100K, >101K) were collapsed into three income categories (0-40K, 41-80K, 81-100+K) to increase the power of the analysis. A subsequent 3(Family Income) X 2(Experimental Condition) X 3 (Photo Category) repeated measures ANOVA yielded no significant effects for family income, $F(4, 106.15) = .19$, $p = .85$, Partial $\eta^2 < .01$, Observed Power = .08. Thus, Family Income was not included as a covariate in the main analysis.

To investigate whether there were any effects due to sensation seeking, a median split was performed to create two groups: 1) participants with "High" sensation seeking scores and 2) participants with "Low" sensation seeking scores. A 2(Sensation Seeking) X 2(Experimental Condition) X 3(Photo Category) repeated measures ANOVA did not yield a significant interaction involving Sensation Seeking, $F(2, 110.48) = .06$, $p = .84$, Partial $\eta^2 < .01$, Observed Power = .06. Due to the absence of a significant interaction effect, Sensation Seeking was not included as a covariate in the main analysis.

To investigate whether there were any ethnicity effects, the number of ethnic categories was first collapsed from six (Caucasian, African American, Asian/Asian

American, Latino/Latina, Native American/Pacific Islander, and Other) to two (Caucasian and Other) in order to increase the power of the analysis. A 2(Ethnicity) X 2(Experimental Condition) X 3(Photo Category) repeated measures ANOVA yielded a significant interaction between Ethnicity and Photo Category, $F(2, 110.20) = 8.13$, $p < .01$, Partial $\eta^2 = .08$, Observed Power = .85.

Table 1

Photo Category Preference Ratings By Ethnicity

Ethnicity	*Photo Category*					
	Natural		*Mixed*		*Built*	
	M	*SD*	*M*	*SD*	*M*	*SD*
Caucasian n = 55	*186.4*	*31.0*	*187.8*	*31.1*	*194.4*	*28.1*
Other n = 43	*166.0*	*29.3*	*165.4*	*29.5*	*196.0*	*37.5*

Note: Values represent cumulative preference scores.

Though there was a significant interaction, Ethnicity was not included as a covariate in the main analysis. Doing so would have produced results that would have been difficult to interpret. Statistically 'partialling' out the effects of Ethnicity would have been comparable to partialling out the effects of sex – it is mathematically possible but the meaning of such an analysis is uncertain (Breaugh, 2006). Instead, Ethnicity was included as an independent variable in the main analysis.

Assumptions of the analysis.

An important assumption of repeated measures analysis of variance is the assumption of sphericity, that is, the independence or orthogonality of within-subjects components. This condition must be met in order for the F test to be considered valid (Dancey & Reidy, 2002). Tests of sphericity, however, indicated that this assumption was violated, Mauchly's $W = .32$, $p < .01$. As the assumption of sphericity rarely holds (Dancey & Reidy, 2002), a number of remedies have been developed. The Greenhouse-Geisser (1959) correction is commonly used to compensate for violations of sphericity (Dancey & Reidy, 2002). This correction was used when interpreting the results of the main analysis.

Main Analysis

The hypothesized interaction, in which participants reminded of their mortality would rate built scenes as more attractive and natural scenes as less attractive relative to control participants, was tested using a 2(Ethnicity) X 2(Experimental Condition) X 3(Photo Category) repeated measures ANOVA with preference ratings as the dependent variable. The anticipated interaction effect between Experimental Condition and Photo Category on preference ratings, however, was not obtained, $F(2, 106.15) = .43$, $p = 54$,

Partial η^2 = .01, Observed Power = .10. Thus, the main hypothesis was not supported. Mortality salience did not have a significant impact on preference for the different photo categories.

Table 2

Photo Category Preference Ratings By Experimental Condition And Ethnicity

	Photo Category					
Experimental	*Natural*		*Mixed*		*Built*	
Condition	*M*	*SD*	*M*	*SD*	*M*	*SD*
Mortality						
Salient						
Caucasian	*186.9*	*31.8*	*191.4*	*30.2*	*202.2*	*28.2*
Other	*170.0*	*32.4*	*169.0*	*34.1*	*194.5*	*41.7*
Total	*179.7*	*32.8*	*181.9*	*33.5*	*198.9*	*34.4*
Non-Mortality						
Salient						
Caucasian	*186.0*	*30.7*	*183.5*	*32.3*	*194.4*	*28.1*
Other	*161.9*	*25.9*	*161.7*	*24.0*	*197.5*	*33.5*
Total	*175.0*	*30.8*	*173.5*	*30.5*	*195.8*	*30.4*

Note: Values represent cumulative preference scores.

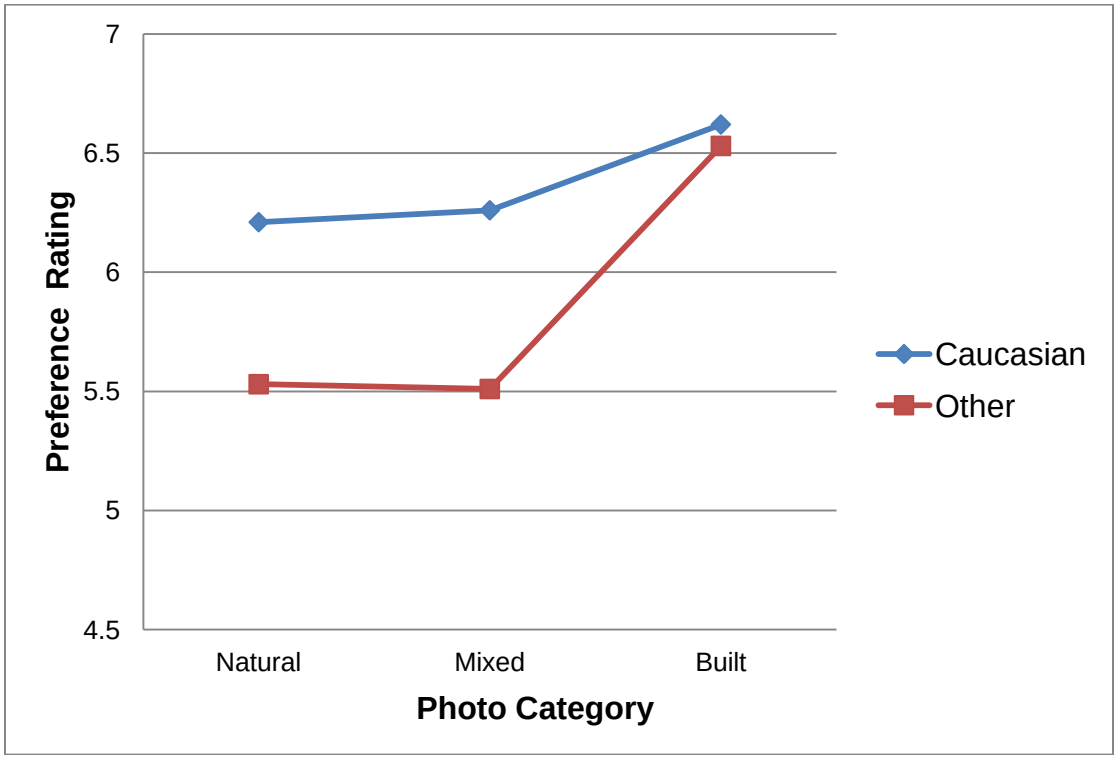
The same analysis, however, yielded an unexpected main effect for photo category, $F(2, 110.20) = 39.05$, $p < .01$, Partial $\eta^2 = .29$, Observed Power = 1.00. Pairwise comparisons revealed that the main effect was accounted for primarily by significantly higher preference scores for the Built category (M = 6.58), which was significantly greater than both the Natural (M = 5.92) and the Mixed (M = 5.93) categories across participants ($p < .01$). This result contradicts the savannah hypothesis, which posits that savannah-like natural environments are preferred to human-made or built environments.

As was mentioned previously, there was a significant two-way interaction between Ethnicity and Photo Category, $F(2, 110.20) = 8.13$, $p < .01$, Partial $\eta^2 = .08$, Observed Power = .85. Independent samples t-tests were performed for each photo category to determine the statistical significance of mean differences between ethnic categories. These analyses revealed that Caucasians rated Natural photos (M = 6.21) and Mixed photos (M = 6.26) as significantly more attractive than non-Caucasian participants (M = 5.53 and M = 5.51, respectively; and, $t[96] = 3.31$, $p < .01$ and $t[96] = 3.62$, $p < .01$, respectively). There were no significant differences, however, between Caucasians' and non-Caucasians' ratings of Built photos (M = 6.62 and M = 6.53, respectively; and, $t[96] = .41$, $p = .69$; See Figure 3).

Given the significant influence of Ethnicity, it was possible that the hypothesized interaction between mortality salience and photo category might be observed in one ethnic category but not the other. Since the Other ethnicity category was too small to allow for a test with adequate statistical power (N = 43), the main analysis was re-run with Caucasians only (N = 55). A 2(Experimental Condition) X 3(Photo Category)

repeated measures ANOVA excluding non-Caucasian participants, however, also did not yield a significant interaction between Experimental Condition and Photo Category, $F(2, 59.12) = .56$, $p = .48$, Partial $\eta^2 = .01$, Observed Power = .12. Thus, this analysis also did not support the main hypothesis.

Figure 3. Photo category preference as a function of ethnicity.

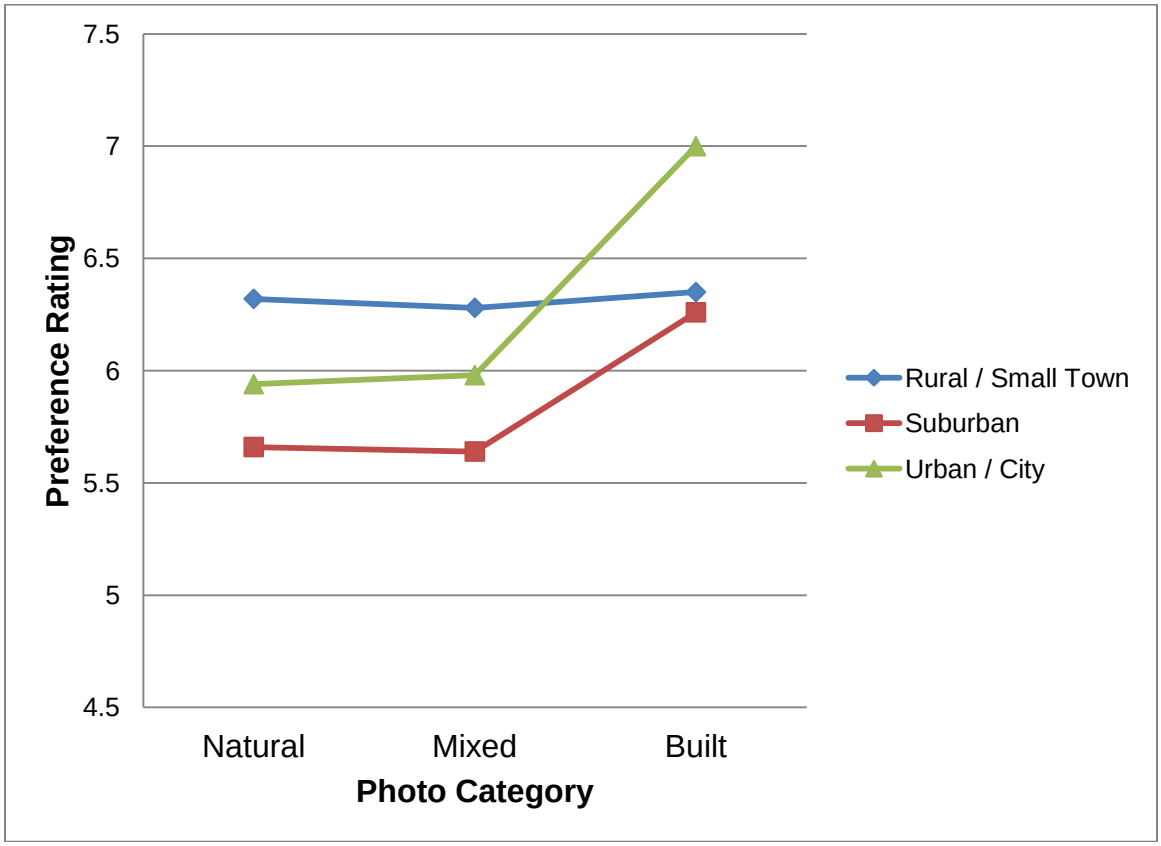


Post-hoc Analyses

Items from the Home Environment Questionnaire were analyzed individually to determine if exposure to outdoor environments and the frequency or degree of enjoyment of outdoor experiences influence participants' preference ratings. Item 1: "Please select from the list below the environment in which you spent the majority of your life." Participants selected between "rural", "small town", "suburban", and "urban/city". In order to create groups with approximately equal and sizeable numbers, rural and small town were grouped together. A 3 (Location) X 2(Condition) X 3(Photo Category) repeated measures ANOVA with preference ratings as the dependent variable yielded no significant interaction between Location and Photo Category, $F(4, 1086.77) = 1.46$, $p = .24$, Partial $\eta^2 = .03$, Observed Power = .33.

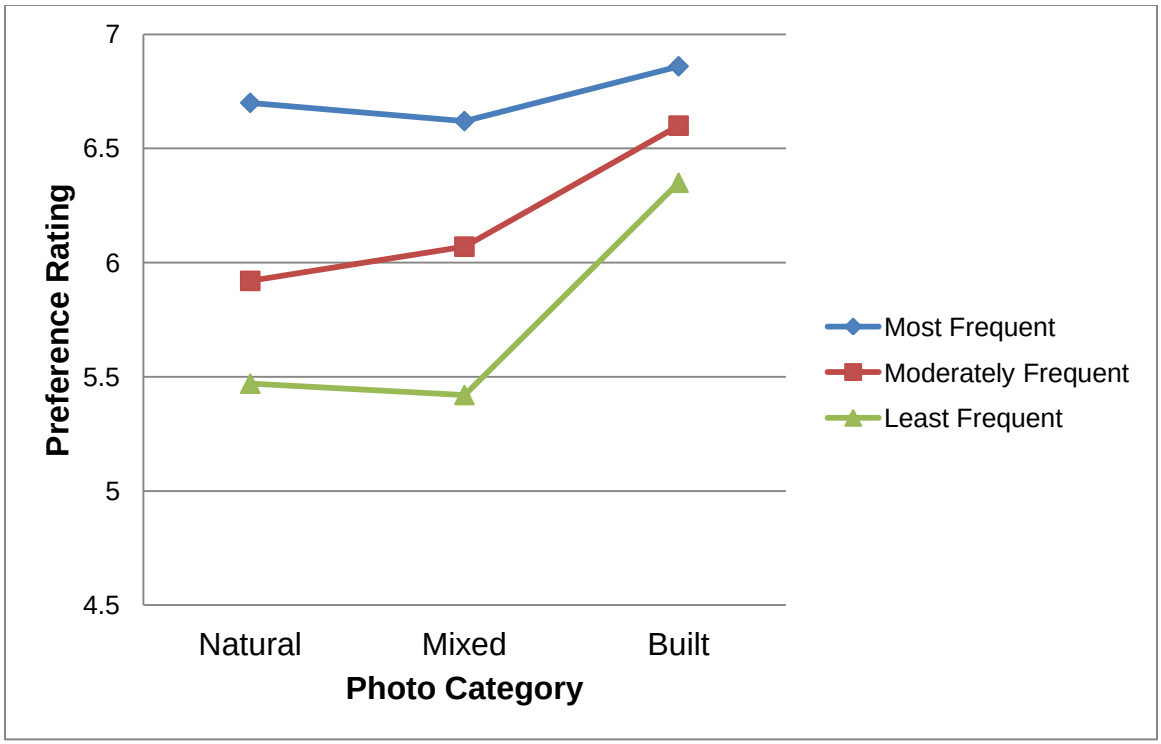
Item 2: "Please select the setting below in which you would most like to live in the future." Participants selected between the same four settings, which, for purposes of the analysis, were also grouped into the same three categories. A 3(Setting) X 2(Experimental Condition) X 3(Photo Category) repeated measures ANOVA yielded a significant interaction between Photo Category and desired future Setting, $F(4, 107.62) = 6.33$, $p < .01$, Partial $\eta^2 = .12$, Observed Power = .93. Subsequent one-way ANOVAs revealed that participants who reported wanting to live in an urban setting rated Built photos as being significantly more attractive than those wanting to live in rural or suburban settings ($M = 7.00$, $M = 6.35$, and $M = 6.26$, respectively). There were no significant differences for either the Natural or Mixed photo categories with respect to desired future Setting (Natural: $M = 5.66$, $M = 5.94$, and $M = 6.32$, respectively; Mixed: $M = 5.64$, $M = 5.98$, and $M = 6.28$, respectively; See Figure 4).

Figure 4. Preference as a function of desired future setting.



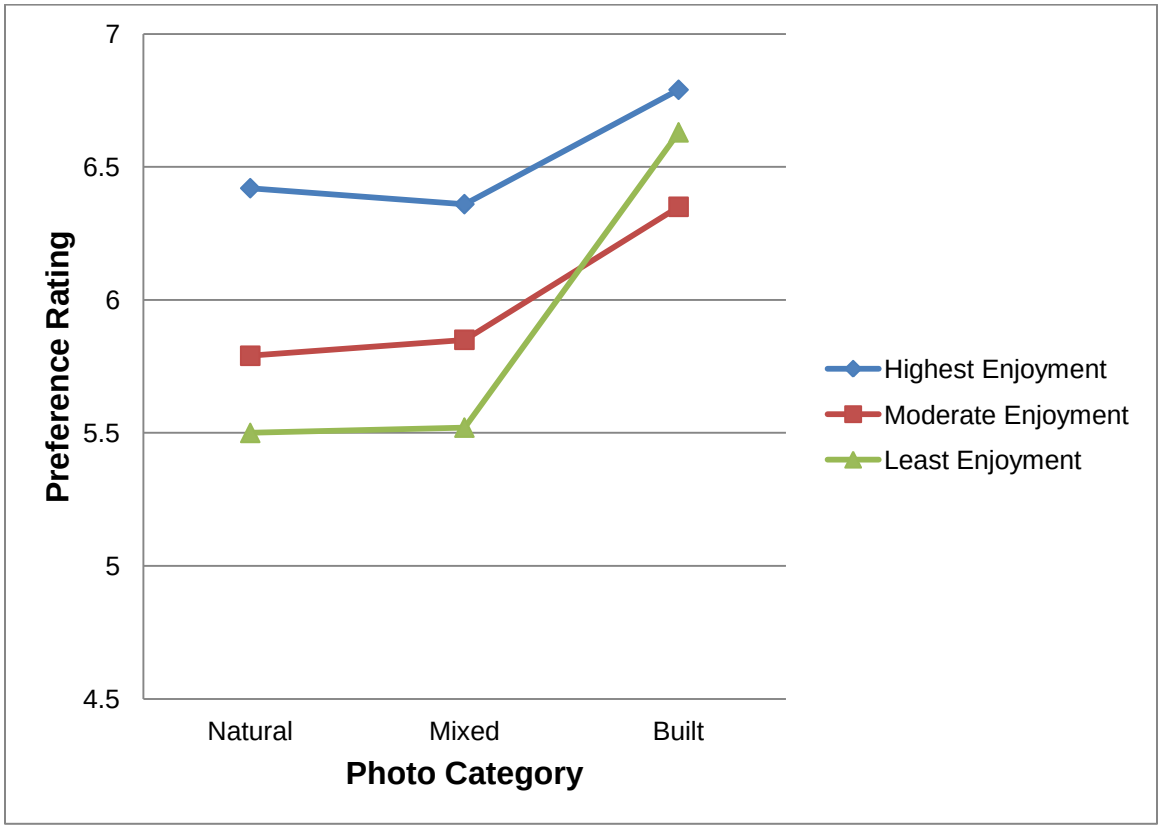
Item 3: “Please estimate the frequency with which you participate in outdoor activities.” Options included “never”, “once or twice in my life”, “less than once a year but more than once or twice”, “approximately once each year”, “two to three times per year”, “approximately every other month”, and “once a month or more”. For purposes of the analysis, these options were collapsed into three groups: the infrequent group consisted of the “never”, “once or twice in my life”, and “less than once a year but more than once or twice” responses, the moderately frequent group consisted of the “approximately once each year” and “two to three times per year” responses, and the most frequent group consisted of the “approximately every other month” and “once a month or more” responses. A 3(Frequency) X 2(Experimental Condition) X 3(Photo Category) repeated measures ANOVA yielded a significant interaction between Frequency and Photo Category, $F(4, 106.34) = 3.15$, $p = .04$, Partial $\eta^2 = .07$, Observed Power = .64. Subsequent one-way ANOVAs indicated that those who participated most frequently in outdoor activities rated Natural photos as significantly more attractive than participants who participated in outdoor activities moderately frequently or infrequently ($M = 6.70$, $M = 5.92$, and $M = 5.47$, respectively). Furthermore, those who participated most frequently or moderately frequently in outdoor activities rated Mixed photos as significantly more attractive than those who participated infrequently ($M = 6.62$, $M = 6.07$, and $M = 5.42$, respectively). No significant differences were found for Built photos with respect to frequency of participation in outdoor activities ($M = 6.86$, $M = 6.60$, and $M = 6.35$, respectively; See Figure 5).

Figure 5. Photo category preference as a function of frequency of participation in outdoor activities.



Item 4: "On average, how much do you enjoy these outdoor activities?" Options included "terrifying, very uncomfortable and/or extremely unpleasant", "mildly scary, uncomfortable and/or unpleasant", "approximately an equal amount of positive and negative feelings and experiences", "enjoyable and pleasant –I like doing these activities", and "I find these activities to be exciting and/or very fulfilling and satisfying". Responses were grouped into three larger categories for purposes of the analysis: the low enjoyment group consisted of the "terrifying, very uncomfortable and/or extremely unpleasant", "mildly scary, uncomfortable and/or unpleasant", and "approximately an equal amount of positive and negative feelings and experiences" responses, the moderate enjoyment group consisted of the "enjoyable and pleasant – I like doing these activities" responses, and the high enjoyment group consisted of the "I find these activities to be exciting and / or very fulfilling and satisfying" responses. A 3(Enjoyment) X 2(Experimental Condition) X 3(Photo Category) repeated measures ANOVA yielded a significant interaction between Enjoyment and Photo Category, $F(4,106.61) = 3.15$, $p = .04$, Partial $\eta^2 = .07$, Observed Power = .64. Subsequent one-way ANOVAs indicated that participants reporting the highest level of enjoyment rated Natural photos as significantly more attractive than the two other groups ($M = 6.42$, $M = 5.79$, and $M = 5.50$, respectively). They also rated Mixed photos as significantly more attractive than those who reported the least amount of enjoyment, but not those who reported moderate enjoyment ($M = 6.36$, $M = 5.52$, and $M = 5.85$, respectively). There were no group differences on Built photo attractiveness with respect to enjoyment ($M = 6.79$, $M = 6.63$, and $M = 6.35$, respectively; See Figure 6).

Figure 6. Photo category preference as a function of enjoyment of outdoor activities.



Additional analyses were undertaken to determine if there was any association between ethnicity and responses to items from the Home Environment questionnaire. Chi square (χ^2) analyses indicated that, indeed, there is an association between ethnicity and participants' responses to Items 3 and 4 on the Home Environment questionnaire. For Item 3, Caucasians were disproportionately likely to report more frequent outdoor experiences and disproportionately unlikely to report less frequent outdoor experiences than "Others", who evidenced the opposite pattern, Pearson's $\chi^2 = 29.40$, df = 2, $p < .01$, Cramer's V = .61. Similarly, on Item 4, Caucasians were disproportionately likely to report having comfortable, enjoyable, and satisfying outdoor experiences and disproportionately unlikely to report having scary or unpleasant outdoor experiences compared to "Others", who evidenced the opposite pattern, Pearson's $\chi^2 = 18.01$, df = 2, $p < .01$, Cramer's V = .48.

Discussion

This study had two primary objectives. First, it attempted to explore whether existential concerns would manifest themselves in a savannah hypothesis research paradigm by manipulating mortality salience. Second, it replicated environmental preference research while correcting for methodological biases inherent in that research, namely, the comparison of highly attractive natural scenes to urban, residential, or commercial scenes of uncertain attractiveness. In addition, many of the supposedly natural scenes used in preference research also contained obvious indications of human influence and were, therefore, not entirely natural (e.g., Herzog, Kaplan, & Kaplan [1982]). This constitutes a methodological confound. By excluding what was hoped to

be the least attractive types of built scenes, including built elements that might be considered attractive, and by using entirely natural scenes, the present study constructed a more balanced and precise test of the savannah hypothesis. In addition, an intermediate category of photos was also included. These photos included both natural and built elements. It was hoped that this mixed category would allow for a more nuanced analysis.

Results showed that death reminders did not have a differential effect on ratings for any photo category. Reminding participants of their own mortality did not appear to influence how attractive they found the different categories of photos.

The lack of support for the main hypothesis suggests either that there is, in fact, no connection between mortality salience and attraction to various outdoor scenes or that the experiment's design limited its ability to detect such a relationship. There is reason to believe that the latter could be true. As was mentioned above, the creation of a test that could satisfy the methodological requirements of both the preference research paradigm and the mortality salience research paradigm required the use of natural scenes that were significantly tamer than the wild natural scenes used in TMT research. Natural photos used in this study were attractive, park-like scenes that were selected precisely because they contained features that convey a sense of safety and opportunity, in accordance with the savannah hypothesis. Relative to the thick, dense, jungle wildernesses of threat and uncertainty used in terror management research, these natural photos were likely to engender less existential anxiety. Compared to Mixed photos, then, the Natural photos might have been more similar than different, despite the inclusion of an obviously human-made object in the Mixed photos. In other words, the psychological valence of

the Natural photos used in this study might have been more similar to that of the cultivated photos used in prior terror management research than to wildnerness photos.

In addition, it is possible that a stronger mortality salience prime would have engendered greater existential anxiety and resulted in a less favorable reaction to Natural photos. The death reminder used in this study is commonly used in terror management studies (e.g. Greenberg et al., 1990, 1994, 1995; Florian, Mikulincer, & Hirschberger, 2002; Heine, Harihara, & Niiya, 2002; McGregor et al., 1998; Rosenblatt et al. 1989) and has frequently been potent enough to produce results that support TMT (Pyszczynski, Greenberg, & Solomon, 2003). However, it has never been used in studies investigating the connection between existential anxiety and nature. A different and perhaps more potent death reminder, the Dutch Fear of Death Inventory (FDI-D), was used in the one study that found mortality salience to influence preference for outdoor environments (Koole & Van den Berg, 2005). The FDI-D consists of five statements about the fear of death (e.g., "I am afraid of death, because I must part with my life when I die"; "I am afraid of death because I will stop thinking after I die"). Participants indicated their agreement with each statement on 9-point scales (1 - *not at all*; 9 - *completely*). The use of necessarily somewhat tame Natural photos combined with what might have been a fairly subtle mortality prime, constituted a rather conservative test of the mortality salience hypothesis.

Although the hypothesized interaction between mortality salience and photo attractiveness was not obtained, participants evidenced a clear preference for the Built photo category. This finding contradicts the savannah hypothesis. Recall that the savannah hypothesis would have predicted that Natural scenes would have been preferred

to all other scenes (Orians, 1980; 1986). Not only were preference for Natural and Mixed scenes not significantly different from one another, but Built scenes were clearly preferred to both. This finding has a number of implications. First, it suggests that once the methodological limitations described above are addressed, the supposedly robust pattern of preference for natural environments no longer holds. What, according to the savannah hypothesis, should have been minor or even irrelevant changes to the Built visual stimuli (Orians, 1980; 1986) resulted in the opposite pattern of preference. This calls into question the conclusions drawn from previous preference research. It also calls into question the savannah hypothesis itself, which is based largely on those conclusions. It may also help explain previous, but less well controlled, studies in which urban photos and photos with urban elements were found to be some of the most attractive settings (e.g., Chokor & Mene, 1992; Herzog, 1984; Herzog, Kaplan, & Kaplan, 1982).

Second, the preference for built scenes implies the presence of alternative factors influencing preference. Since innate, psycho-physiological attraction to savannah-like elements clearly cannot account for the preference for built scenes, what does? One possibility is the appeal of hearth and home. For many, those words evoke visions of friends and family, creature comforts such as warmth and food and soft beds, and feelings of safety and familiarity. Perhaps they even elicit a sense of stability, permanence, or predictability. Furthermore, many of the photos were of villages and towns and, therefore, implied the existence of the various social and economic ties that bind and define community. On some level, then, the photos represent interdependent, communal living, a cornerstone of life as we know it. Because they signal the presence of fundamental elements of civilization, it is plausible that such representations are also

comforting and appealing, just as the residences themselves might be. Regardless of whether or not participants were reminded of their mortality, these associations might have been present, explicitly or implicitly, and might have predisposed them to respond positively toward built scenes.

Although such speculation is inconsistent with the savannah hypothesis, it is not necessarily inconsistent with evolutionary principles. Humans are social creatures. We need others to survive. We settle and colonize and group together in solidarity against the forces of nature. Our social nature is part of our genetic heritage and it is part of what makes us such successful animals (Brothers, 2001). An affinity for scenes of peaceful, orderly civilization would certainly be consistent with our profound social predilections. Whereas the savannah hypothesis posits the existence of an, arguably, vestigial and highly specific evolved neurological mechanism, a preference for built scenes might be thought of as a manifestation of much more general adaptations related to our need to connect with and respond to others.

Another possible explanation for the preference for Built photos is methodological. The results might have less to do with the content of the photos and more to do with their composition, for example, their color, perspective, or photo quality. Although attempts were made to minimize such potential differences (e.g., with the use of counterbalanced photo sets), none of these factors were measured or experimentally controlled in this study. It is possible, for example, that Built photos were perceived as higher quality than Natural photos. Such a difference could account for participants' preferences. Future studies should control for these factors.

Another notable result was the different pattern of preference demonstrated by Caucasian participants and ethnic minority participants. Together, African American, Asian, and Latino and Latina participants rated Natural and Mixed photos as significantly less attractive than Caucasian participants. Post-hoc analyses showed that African Americans, by themselves, evidenced the same significant difference. These findings are similar to other studies in which inner-city African American participants rated natural photos as less attractive that their Caucasian counterparts (Kaplan & Kaplan, 1989; Zube, Pitt, & Anderson, 1974). It is also broadly consistent with cross-cultural studies demonstrating that different ethnicities and cultures respond significantly differently to outdoor scenes (e.g., Chokor & Mene [1992]; Hull & Revell [1989]; Yi [1992]). Assuming that ethnicity, per se, is not responsible for the observed differences, these findings suggest that learning and context play a substantial role in an individual's response toward nature. Other data suggesting that age and, presumably, the development, learning, and new experiences that correspond to the passage of time, mediate our relationship to different types of outdoor environments (e.g., Balling & Falk, 1982; Regan & Horn, 2005) further highlights the role that individual differences seem to play in our relationship to outdoor environments. The present study, with its more careful control of visual stimuli, confirms that individual differences are substantial and not merely a nuisance variable that accounts for a small percentage of the total variance explained by supposedly universal and biologically-based mechanisms.

None of these studies, however, provide many clues about what sets different ethnic groups apart with respect to preference. One of the obvious possibilities is that socio-economic class is associated with different experiences of and beliefs about nature

and that socio-economic class is, in turn, associated with ethnicity. Regrettably, the only information about participants' class came from one question on the Demographic questionnaire asking about parental income. Though participants' reports of family income was not related to preference levels for any photo categories, this single item does not provide much information about participants' socio-economic level or class. Especially in light of the ethnic differences found in this study, it is unfortunate that little can be said about participants' backgrounds. Future studies might benefit from a more thorough and multi-faceted assessment of this variable.

Similarly, Home Environment question 1, which enquired about the environment in which participants spent the majority of their upbringing was not related to preference ratings. However, this item might have been too crude to validly measure this aspect of participants' experience. Possible responses to these questions included only 'rural', 'small town', 'suburban' and 'urban / city'. These choices leave a great deal to the imagination. A better measure might have provided more detailed verbal descriptions of these environments or even included photographic representations of each category.

Nevertheless, responses to Home Environment question 2, which enquired about the environment in which participants would most like to live in the future and which used the same format as Home Environment question 1, were significantly related to preference ratings. Specifically, participants who reported wanting to live in an urban setting rated Built photos as being significantly more attractive than those wanting to live in rural or suburban settings. It is difficult to know precisely what this result means, but it is another indication that individual differences (in this case a wish about the future) are related to environmental preferences.

The results of Home Environment questions 3 and 4 are more telling. Recall that these items, which dealt with the frequency with which participants engaged in outdoor activities and their level of enjoyment of those activities, were related to photo preference. Specifically, a higher reported frequency of participation in outdoor activities, such as hiking, was related to significantly greater liking for Natural and Mixed photos. In addition, greater reported enjoyment of outdoor activities was also associated with significantly greater liking for Natural and Mixed scenes. Further analysis showed that Caucasian participants were significantly more likely to report frequent participation in outdoor activities than ethnic minority participants. Caucasians were also significantly more likely to report enjoying such activities compared to ethnic minorities. Thus, it appears that ethnic minority participants and Caucasian participants had different experiences of nature and it suggests that these differences accounted, in part, for their significantly lower ratings of Natural and Mixed photos.

Assuming that Caucasian participants and ethnic minority participants do have different experiences of nature, what explains it? We can only speculate about what might account for Caucasians' more frequent and more enjoyable outdoor experiences. One plausible explanation is that minority participants are disproportionately isolated from natural environments due to urban living or to having less leisure time or disposable income and, thus, do not become as familiar with or comfortable in those settings. Another possibility is that, regardless of degree of exposure to the outdoors, cultural attitudes toward nature are more negative (or more neutral) among minority participants. Clearly, more research is needed to elucidate the connection between experience and preference. Although we cannot say what accounts for participants' reported differences

regarding the outdoors, we can say that experience appears to shape preference (Wohlwill, 1976). This finding also undermines the savannah hypothesis. The extent to which experience and learning affect preference is the extent to which current psycho-evolutionary explanations do not hold.

In conclusion, terror management concerns did not appear to influence preference for photo category. However, the clear preference for Built photographs contradicts the savannah hypothesis and its psycho-evolutionary basis. Nevertheless, the preference for Built photos could be consistent with broader adaptationist claims regarding human nature. Ironically, the same adaptationist explanations could be used to support Terror Management Theory and the non-conscious psychological forces motivating attraction for Built scenes. Still, the significant ethnic differences with regard to preference for Mixed and Natural photographs suggests that learning and experience influence attraction or repulsion for outdoor scenes and is another indication that purely psycho-evolutionary explanations cannot account entirely for preference. There are many unanswered questions regarding precisely what demographic, cultural, and behavioral factors underlie different response and attitudes toward nature. Future studies will benefit from a more in-depth assessment of these under-appreciated and under-studied variables.

References

Agras, S., Sylvester, D., & Oliveau, D. (1969). The epidemiology of common fears and phobia. *Comprehensive Psychiatry, 10(2),* 151-156.

Appleton J. (1975). *The experience of nature*. London: Wiley.

Appleton, J. (1988). Prospects and refuges revisited. In J. L. Nasar (Ed.), *Environmental aesthetics: theory, research, and applications* (pp. 27-44). Cambridge: Cambridge University Press.

Arndt, J., Allen, J. J. B., & Greenberg, J. (2001). Traces of terror: Subliminal death primes and facial electromyographic indices of affect. *Motivation and Emotion, 25,* 253-277.

Arndt, J., Cook, A., & Routledge, C. (2004). The blueprint of terror management: Understanding the cognitive architecture of psychological defense against the awareness of death. In J. Greenberg, S. L. Koole & T. Pyszczynski (Eds.), *Handbook of experimental existential psychology* (pp. 35-53). New York: Guilford Press.

Arndt, J., Greenberg, J., Pyszzczynski, T., & Solomon, S. (1997). Subliminal presentation of death reminders leads to increased defense of the cultural worldview. *Psychological Science, 8,* 379-385.

Arndt, J., Solomon, S., Kasser, T., & Sheldon, K. M. (2004). The urge to splurge: A terror management account of materialism and consumer behavior. *Journal of Consumer Psychology, 14*(3), 198-212.

Arthur, L. M. (1977). Predicting scenic beauty of forest environments: Some empirical tests. *Forest Science, 23(2),* 151-160.

Balling, J. D. & Falk, J. H. (1982). Development of visual preference for natural environments. *Environment and Behavior, 14(1),* 5-28.

Barash, D. P. (1979). *The whispering within: Evolution and the origin of human nature.* New York: Penguin.

Becker, E. (1971). *The birth and death of meaning: An interdisciplinary perspective on the problem of man*. New York: Free Press.

Becker, E. (1973). *The denial of death*. New York: Free Press.

Becker, E. (1975). *Escape from evil*. New York: Free Press.

Bernaldez, F.G. & Parra, F. (1979). Dimensions of landscape preferences from pairwise comparisons. In: Proceedings of Our National Landscape: A Conference on Applied Techniques for Analysis and Management of the Visual Resource (USDA Forest Service General Technical Report, PSB-35: 256-262).

Brothers, L (2001). *Friday's footprint: How society shapes the human mind*. Oxford: Oxford University Press.

Brown, T. C. & Daniel, T. C. (1986). Predicting scenic beauty of timber stands. *Forest Science, 32(2),* 471-487.

Brush, R. O. & Palmer, J. F. (1979). Measuring the impact of urbanization on scenic quality: Land use change in the Northeast. In: Proceedings of Our National Landscape: A Conference n Applied Techniques for Analysis and Management of the Visual Resource (USDA Forest Service General Technical Report, PSB-35: 358-364).

Buss, D. M. (1999). *Evolutionary psychology: The science of the mind.* Boston: Allyn & Bacon.

Butcher, J. N., Dahlstrom, W. G., Graham, J. R., Tellegen, A. & Kaemmer, B. (1989). *MMPI-2: Manual for administration and scoring*. Minneapolis: University of Minnesota.

Chokor, B. A., & Mene, S. A. (1992). An assessment of preference for landscapes in the developing world: Case study of Warri, Nigeria, and environs. *Journal of Environmental Management, 34*, 237-256.

Clamp, P. (1976). Evaluating English landscapes – some recent developments. *Environment and Planning, 8*, 79-92.

Cohen, J. (2003). A power primer. In A. E. Kazdin (Ed.) *Methodological issues and strategies in clinical research* (pp. 427-436). Washington, D.C.: American Psychological Association.

Crowne, D. P., & Marlowe, D. (1960). A new scale of social desirability independent of psychopathology. *Journal of Consulting Psychology, 24*, 349-354.

Damasio, A. R. (2005). *Descartes' error: Emotion, reason, and the human brain*. New York: Harper Collins.

Daniel, T. C., & Vining, J. V. (1983). Methodological issues in the assessment of landscape quality. In I. Altman & J. F. Wohlwill (Eds.) *Human behavior and environment: Advances in theory and research* (Vol. 6, pp. 39-83). New York: Plenum Press.

Dawkins, R. (2006). *The selfish gene*. New York: Oxford University Press.

De Becker, G. (1997). *The gift of fear: Survival signals that protect us from violence*. Boston: Little, Brown.

Eisenberg, E. (1998). *The ecology of eden*. New York: Alfred A. Knopf Inc.

Evans, G. W. & Wood, K. W. (1980). Assessment of environmental aesthetics in scenic highway corridors. *Environment and Behavior, 12(2),* 255-273.

Faul, F., Erdfelder, E., Lang, A. G., & Buchner, A. (2007). G*Power 3: A flexible statistical power analysis program for the social, behavioral, and biomedical sciences. *Behavior Research Methods, 39,* 175-191.

Florian, V., & Mikulincer, M. (1997). Fear of death and the judgment of social transgressions: A multidimensional test of Terror Management Theory. *Journal of Personality and Social Psychology, 73(2),* 369-380.

Fredrickson, L. M., & Anderson, D. H. (1999). A qualitative exploration of the wilderness experience as a source of spiritual inspiration. *Journal of Environmental Psychology, 19,* 21-39.

Goldenberg, J. L., Cox, C. R., Pyszczynski, T., Greenberg, J., & Solomon, S. (2002). Understanding human ambivalence about sex: The effects of stripping sex of meaning. *The Journal of Sex Research, 39*(4), 310-320.

Goldenberg, J. L., Pyszczynski, T., Greenberg, J., & Solomon, S. (2000). Fleeing the body: A terror management perspective on the problem of human corporeality. *Personality and Social Psychology Review, 4*(3), 200-218.

Goldenberg, J. L., Pyszczynski, T., Greenberg, J., Solomon, S., Kluck, B., & Cornwall, R. (2001). I am *not* an animal: Mortality salience, disgust, and the denial of human creatureliness. *Journal of Environmental Psychology, 130*(3), 427-435.

Goldenberg, J. L., Pyszcynski, T. McCoy, S. K., Greenberg, J., & Solomon, S. (1999). Death, sex, love, and neuroticism: Why is sex such a problem? *Journal of Personality and Social Psychology, 77,* 1173-1187.

Gould, S. J. (2000). More things in heaven and earth. In H. Rose and S. Rose (Eds.), *Alas, poor Darwin* (pp. 101-126). New York: Harmony Books.

Gould, S. J. & Lewontin, R. C. (1979). The spandrels of San Marco and the Panglossian paradigm: A critique of the adaptationist paradigm. *Proceedings of the Royal Society of London: Series B, 205*, 581-598.

Greenberg, J., Porteus, J., Simon, L., Pyszczynski, T., & Solomon, S. (1995). Evidence of a Terror Management function of cultural icons: the effects of mortality salience on the inappropriate use of cherished cultural symbols. *Personality and Social Psychology Bulletin, 21(11)*, 1221-1228.

Greenberg, J., Pyszczynski, T., Solomon, S., Pinel, E., Simon, L, & Jordan, K. (1993). Effects of self-esteem on vulnerability-denying defensive distortions: Further evidence of an anxiety-buffering function of self-esteem. *Journal of Experimental Social Psychology*, *29*, 229-251.

Greenberg, J., Pyszczynski, T., Solomon, S., Simon, L., & Breus, M. (1994). Role of consciousness and accessibility of death-related thoughts in mortality salience effects. *Journal of Personality and Social Psychology, 67*(4), 627-637.

Greenberg, J., Simon, L., Harmon-Jones, E., Solomon, S., Pyszczynski, T., & Lyon, D. (1995). Testing alternative explanations for mortality salience effects: Terror management, value accessibility, or worrisome thoughts. *European Journal of Social Psychology*, *25*, 417-433.

Greenberg, J., Simon, L., Pyszczynski, T., Solomon, S., & Chatel, D. (1992). Terror

management and tolerance: Does mortality salience always intensify negative reactions to others who threaten one's worldview? *Journal of Personality and Social Psychology, 63,* 212-220.

Harlow, H. F., Harlow, M. K., & Suomi, S. J. (1971). From thought to therapy: Lessons from a primate laboratory. *American Scientist, 59*, 538-549.

Harmon-Jones, E., Simon, L., Greenberg, J., Solomon, S., Pyszczynski, T., & McGregor, H. A. (1997). Terror management theory and self-esteem: Evidence that increased self-esteem reduces mortality salience effects. *Journal of Personality and Social Psychology, 72,* 24-36.

Heerwagen, J. H., & Orians, G. H. (1993). Humans, habitats, and aesthetics. In S. R. Kellert & E. O. Wilson (Eds.), *The biophilia hypothesis* (pp. 138-172). Washington, D.C.: Island Press.

Herzog, T. R. (1984). A cognitive analysis of preference for field-and-forest environments. *Landscape Research, 9,* 10-16.

Herzog, T. R., Kaplan, S., & Kaplan, R. (1982). The prediction of preference for unfamiliar urban places. *Population and Environment, 5(1),* 43-59.

Hildebrand, G. (1999). *Origins of architectural pleasure*. Berkley, CA: University of California.

Howell, D. C. (2007). *Statistical methods for psychology*. United States: Thomson Wadsworth.

Hull, R. B., Buhyoff, G. J., & Daniel, T. C. (1984). Measurement of scenic beauty: The law of comparative judgment and scenic beauty estimation procedures. *Forest Science, 30(4),* 1084-1096.

Hull, R. B., & Revell, G. R. B. (1989). Cross-cultural comparisons of landscape scenic beauty evaluations: A case study in Bali. *Journal of Environmental Psychology, 9*, 177-191.

Ittleson, W. H. (1973). Environment perception and contemporary perceptual theory. In W. H. Ittelson (Ed.), *Environment and cognition* (pp.1-19). New York: Seminar.

Izard, C. E. (1977). *Human emotions*. New York: Plenum.

Izard, C. E., Kagan, J., & Zajonc, R. B (1984). *Emotions, cognitions, and behavior*. Cambridge: Cambridge University Press.

Kaplan, R. (1984). Wilderness perception and psychological benefits: An analysis of a continuing program. *Leisure Sciences, 6*(3), 271-289.

Kaplan, R. (1995). The restorative benefits of nature: Toward an integrative framework. *Journal of Environmental Psychology, 15*, 169-182.

Kaplan, R., & Kaplan, S. (1989). *The experience of nature: A psychological perspective*. Cambridge: Cambridge University Press.

Kaplan, S. (1987). Aesthetics, affect, and cognition. *Environment and Behavior, 19(1)*, 3-32.

Kaplan, S., Kaplan, R. & Wendt, J.S. (1972). Rated preference and complexity for natural and urban visual material. *Perception and Psychophysics, 12(4),* 354-356.

Koole, S. L. (2003). The confrontation with wilderness triggers death-related thought. Unpublished data, Free University Amsterdam.

Koole, S. L., & van den Berg, A. (2005). Lost in the wilderness: Terror management, action orientation, and nature evaluation. *Journal of Personality and Social Psychology, 88*(6), 1014-1028.

Koole, S. L., & van den Berg, A. E. (2004). Paradise lost and reclaimed: A motivational analysis of human-nature relations. In J. Greenberg, S. L. Koole & T. Pyszczynski (Eds.), *Handbook of experimental existential psychology* (pp. 86-103). New York: The Guilford Press.

Lyons, E. (1983). Demographic correlates of landscape preference. *Environment and Behavior, 15*, 487-511.

Marks, I. (1987). *Fears, phobias, and rituals: panic, anxiety, and their disorders*. New York: Oxford University Press.

Moreland, R. L. & Zajonc, R. B. (1977). Is stimulus recognition a necessary condition for the occurrence of exposure effects? *Journal of Personality and Social Psychology, 35*, 191-199.

Nasar, J. L. (1988). Perception and evaluation of residential street scenes. In J. L. Nasar (Ed.), *Environmental aesthetics: Theory, research, and applications* (pp. 275-289). Cambridge: Cambridge University Press.

Nohl, W. (1988). Open space in cities: In search of a new aesthetic. In J. L. Nasar (Ed.), *Environmental Aesthetics: Theory, Research, and Applications* (pp. 74-83). Cambridge: Cambridge University Press.

Ohman, A., & Mineka, S. (2001). Fears, phobias, and preparedness toward an evolved module of fear and fear learning. *Psychological Review, 108*(3), 483-522.

Ohman, A., & Soares, J. J. F. (1994). "Unconscious anxiety": Phobic responses to masked stimuli. *Journal of Abnormal Psychology, 103*, 121-240.

Ohman, A., & Wiens, S. (2003). On the automaticity of autonomic responses in emotion: An evolutionary perspective. In R. J. Davidson, K. R. Scherer, and H. Hill Goldsmith (Eds.), *Handbook of affective sciences*. Oxford: Oxford University.

Orians, G. H. (1980). Habitat selection: General theory and applications to human behavior. In J. S. Lockhard (Ed.), *Evolution of human social behavior*. New York: Elsevier North Holland.

Orians, G. H. (1986). An ecological and evolutionary approach to landscape aesthetics. In E. C. Penning-Rowsell & D. Lowenthal (Eds.), *Meanings and values in landscape*. London: Allen & Unwin.

Orians, G. H. & Heerwagen, J. H. (1992). Evolved responses to landscapes. In J. H. Barkow, L. Cosmides, & J. Tooby (Eds.), *The adapted mind*. New York: Oxford University Press.

Palmer, J. F. (1978). An investigation of the conceptual classification of landscapes and its application to landscape planning issues. In S. Weidemann and J. R. Anderson (Eds.), *Priorities for environmental design research* (pp. 92-103). Washington, D.C.: Environmental Design Research Association.

Purcell, A. T., Lamb, R. J., Peron, E. M., & Falchero, S. (1994). Preference of preferences for landscape? *Journal of Environmental Psychology, 14*(3), 195-209.

Pyszczynski, T., & Greenberg, J. (1999). A dual-process model of defense against conscious and unconscious death-related thoughts: An extension of terror management theory. *Psychological Review, 106*(4), 835-845.

Pyszczynski, T., Greenberg, J., & Solomon, S. (2003). *In the wake of 9/11: The*

psychology of terror. Washington, D.C.: American Psychological Association.

Pyszczynski, T., Wicklund, R. A., Floresku, S., Koch, H., Gauch, G., Solomon, S., et al. (1996). Whistling in the dark: Exaggerated consensus estimates in response to incidental reminders of mortality. *Psychological Science, 7*(6), 332-336.

Regan, C. L. & Horn, S. A. (2005). To nature or not to nature: Associations between environmental preferences, mood states and demographic factors. *Journal of Environmental Psychology, 25*, 57-66.

Ribe, R. G. (1989). The aesthetics of forestry: what has empirical preference research taught us? *Environmental Management, 13(1)*, 55-74.

Rosenblatt, A., Greenberg, J., Solomon, S., Pyszczynski, T., & Lyon, D. (1989). Evidence for terror management theory I: The effects of mortality salience on reactions to those who violate or uphold cultural values. *Journal of Personality and Social Psychology, 57,* 681-690.

Schama, S. (1995). *Landscape and memory*. New York: Random House.

Seligman, M. E. P. (1971). Phobias and preparedness. *Behavior Therapy, 2*, 307-320.

Senate Resolution 83, 91st Congress, 42 Congressional Record 4321-4347 (1969) (enacted).

Simon, L., Greenberg, J., Harmon-Jones, E., Solomon, S., Pyszczynski, T., Arndt. J., et al. (1997). Cognitive-experiential self-theory and terror management theory: Evidence that terror management occurs in the experiential system. *Journal of Personality and Social Psychology, 72,* 1132-1146.

Solomon, S., Greenberg, J., & Pyszczynski, T. (1991). A terror management theory of social behavior: The psychological functions of self-esteem and cultural

worldviews. In M. P. Zana (Ed.), *Advances in experimental social psychology* (pp. 91-159). San Diego: Academic Press.

Solomon, S., Greenberg, J., & Pyszczynski, T. (2004). The cultural animal: Twenty years of terror management theory and research. In J. Greenberg, S. L. Koole & T. Pyszczynski (Eds.), *Handbook of experimental existential psychology* (pp. 13-34). New York: Guilford Press.

Thayer, R. L. & Atwood, B. G. (1978). Plants, complexity and pleasure in urban and suburban environments. *Environmental Psychology and Nonverbal Behavior, 3(2)*, 67-76.

Tuan, Y. F. (1971). *Man and nature*. Resource paper No. 10. Washington, D.C.: Association of American Geographers.

Ulrich, R. S. (1979). Visual landscapes and psychological well-being. *Landscape Research, 4*, 17-23.

Ulrich, R. S. (1977). Visual landscape preference: A model and application. *Man-Environment Systems, 7(5)*, 279-292.

Ulrich, R. S. (1981). Natural versus urban scenes: Some psychobiological effects. *Environment and Behavior, 13(5)*, 523-556.

Ulrich, R. S. (1983). Aesthetic and affective response to natural environment. In I. Altman & J. F. Wohlwill (Eds.), *Behavior and the natural environment* (Vol. 6, pp. 85-125). New York: Plenum Press.

Ulrich, R. S. (1986). Human responses to vegetation and landscapes, *Landscape and Urban Planning, 13*, 29-44.

Ulrich, R. S., Simons, R. F., Losito, B. D., Fiorito, E., Miles, M., & Zelson, M. (1991). Stress recovery during exposure to natural and urban environments. *Journal of Environmental Psychology, 11*, 201-230.

Ulrich, R. S. (1993). Biophilia, biophobia, and natural landscapes. In S. R. Kellert & E. O. Wilson (Eds.), *The biophilia hypothesis* (pp. 73-137). Washington D.C.: Island Press.

Ulrich, R. S., Simons, R. F., Losito, B. D., Fiorito, E., & Miles, M. A. (1991). Stress recovery during exposure to natural and urban environments. *Journal of Environmental Psychology, 11*, 201-230.

van den Berg, A., Koole, S. L., & van der Wulp, N. Y. (2003). Environmental preference and restoration: (How) are they related? *Journal of Environmental Psychology, 23*, 135-146.

van den Berg, A., & ter Heijne, M. (2005). Fear versus fascination: An exploration of emotional responses to natural threats. *Journal of Environmental Psychology, 25*, 261-272.

van den Berg, A., & Vlek, C. J. (1998). The influence of planned-change context on the evaluation of natural landscapes. *Landscape and Urban Planning, 43*, 1-10.

Williams, K., & Harvey, D. (2001). Transcendent experience in forest environments. *Journal of Environmental Psychology, 21*, 249-260.

Wilson, E. O. (1984). *Biophilia*. Cambridge, MA: Harvard University Press.

Wilson, E. O. (1998). *Consilience*. New York: Knopf.

Wilson, W. R. (1979). Feelings more than we can know: Exposure effects without learning. *Journal of Personality and Social Psychology*, 37, 811-821.

Wohlwill, J. F. (1976). Environmental aesthetics: The environment as a source of affect. In I. Altman & J. F. Wohlwill (Eds.) *Human behavior and environment: Advances in theory and research* (pp. 37-82). New York: Plenum.

Wohlwill, J. F. (1983). The concept of nature: A psychologist's view. In I. Altman & J. F. Wohlwill (Eds.), *Behavior and the natural environment* (Vol. 6, pp. 5-37). New York: Plenum Press.

Wohlwill, J. F. & Harris, G. (1980). Response to congruity or contrast for man-made features in natural recreation settings. *Leisure Sciences, 3,* 349-365.

Woodcock, D. M. (1982). A functionalist approach to environmental preference. Unpublished Doctoral Dissertation. University of Michigan, Ann Arbor, MI.

Yi, Y. K. (1992). Affect and cognition in aesthetic experiences of landscapes. Unpublished doctoral dissertation, Department of Landscape Architecture and Urban Planning, Texas A&M University.

Zajonc, R. B. (1980). Preferences need no inferences. *American Psychologist, 35*, 151-175).

Zube, E. H., Pitt, D. G., & Anderson, T. W. (1974). Perception and prediction of scenic resource values of the northeast. In E. H. Zube, R. O. Brush & J. G. Fabos (Eds.), *Landscape assessment: Values, perceptions, and resources* (pp. 151-167). Stroudsburg, PA: Dowden.

Zube, E. H., Pitt, D. G., & Evans, G. W. (1983). A lifespan developmental study of landscape assessment. *Journal of Environmental Psychology, 3,* 115-128. 576.

Zube, E. H., Sell, J. L., & Taylor, J. G. (1982). Landscape perception: Research,

application and theory. *Landscape Planning, 9*, 1-33.

Zuckerman, M. (1994). *Behavioral expressions and biosocial bases of sensation seeking*. Cambridge: Cambridge University.

Zuckerman, M. (2007). The sensation seeking scale V (SSS-V): Still reliable and valid. *Personality and Individual Differences, 43*, 1303-1305.

Zuckerman, M., Eysenck, S., & Eysenck, H. J. (1978). Sensation seeking in England and America: Cross-cultural, age, and sex comparisons. *Journal of Consulting and Clinical Psychology, 46(1)*, 139-149.

Appendix A

Measures

Demographic Questionnaire

Please answer the questions below.

1. Please write your age in the space provided: _____

2. How would you describe your ethnicity?
    a. White / Caucasian
    b. Black / African American
    c. Latino / Latina
    d. Asian / Asian American
    e. Native American / Pacific Islander
    f. Other (e.g., biracial)

3. What is your gender?
    a. Male
    b. Female

4. If you do not live independently, what was your parents' or caregivers' approximate combined annual income last year (before taxes)? If you live independently, what was your household's approximate annual income last year (before taxes)?
    a. $0 - $20,000
    b. $21,000 - $40,000
    c. $41,000 - $60,000
    d. $61,000 - $80,000
    e. $81,000 - $100,000
    f. >$100,000

Mortality Salience Prime

Recent research suggests that feelings and attitudes about death and dying tell us a considerable amount about an individual's personality. In answering the questions, go with your natural, gut reactions. Your honest responses to the following questions are greatly appreciated.

1. Please briefly describe the emotions that the thought of your own death arouses in you.

   _____

   _____

   _____

   _____

   _____

2. Jot down, as specifically as you can, what you think will happen to you physically as you die and once you are physically dead.

   _____

   _____

   _____

   _____

   _____

Control Questionnaire

Recent research suggests that feelings and attitudes about watching TV tell us a considerable amount about an individual's personality. In answering the questions, go with your natural, gut reactions. Your honest responses to the following questions are greatly appreciated.

1. Please briefly describe the emotions that the thought of watching TV arouses in you.

   _____

   _____

   _____

   _____

   _____

2. Jot down, as specifically as you can, what you think will happen to you physically as you watch TV and once you have watched it.

   _____

   _____

   _____

   _____

   _____

Distraction Questionnaire

Listed below are a number of statements concerning personal attitudes and traits. Read each statement and decide whether it is true or mostly true as it pertains to you personally or false or mostly false as it pertains to you personally. If the statement is true or mostly true as it pertains to you, circle the letter T; if the statement is false or mostly false as it pertains to you, circle the letter F.

T F 1. Before voting I thoroughly investigate the qualifications of all the candidates

T F 2. I never hesitate to go out of my way to help someone in trouble.

T F 3. It is sometimes hard for me to go on with my work if I am not encouraged.

T F 4. I have never intensely disliked anyone.

T F 5. On occasion I have had doubts about my ability to succeed in life.

T F 6. I sometimes feel resentful when I don't get my way.

T F 7. I am always careful about my manner of dress.

T F 8. My table manners at home are as good as when I eat out in a restaurant.

T F 9. If I could get into a movie without paying for it and be sure I was not seen I would probably do it.

T F 10. On a few occasions I have given up doing something because I thought too little of my ability.

T F 11. I like to gossip at times.

T F 12. There have been times when I felt like rebelling against people in authority even though I knew they were right.

T F 13. No matter who I'm talking to I'm always a good listener.

T F 14. I can remember "playing sick" to get out of something.

T F 15. There have been occasions when I took advantage of someone.

T F 16. I'm always willing to admit it when I make a mistake.

T F 17. I always try to practice what I preach.

T F 18. I don't find it particularly difficult to get along with loud-mouthed, obnoxious people

T F 19. I sometimes try to get even rather than forgive and forget.

T F 20. When I don't know something I don't at all mind admitting it.

T F 21. I am always courteous, even to people who are disagreeable.

T F 22. At times I have really insisted on having things my own way.

T F 23. There have been occasions when I felt like smashing things.

T F 24. I would never think of letting someone else be punished for my wrongdoings.

T F 25. I never resent being asked to return a favor.

T F 26. I have never been irked when people expressed ideas very different from my own.

T F 27. I never make a long trip without checking the safety of my car.

T F 28. There have been times when I was quite jealous of the good fortune of others.

T F 29. I have almost never felt the urge to tell someone off.

T F 30. I am sometimes irritated by people who ask favors of me.

T F 31. I have never felt that I was punished without cause.

T F 32. I sometimes think when people have a misfortune they only got what they deserved.

T F 33. I have never deliberately said something that hurt someone's feelings.

Listed below are some additional statements concerning personal attitudes and traits. Read each statement and decide whether it is true or mostly true as it pertains to you personally or false or mostly false as it pertains to you personally. If the statement is true or mostly true as it pertains to you, circle the letter T. If the statement is false or mostly false as it pertains to you, circle the letter F.

1. I do not tire quickly.	T	F
2. I am often sick to my stomach	T	F
3. I am about as nervous as other people.	T	F
4. I have very few headaches.	T	F
5. I work under a great deal of strain.	T	F
6. I cannot keep my mind on one thing.	T	F
7. I worry over money and business.	T	F
8. I frequently notice my hand shakes when I try to do something.	T	F
9. I blush as often as others.	T	F
10. I worry quite a bit over possible troubles.	T	F
11. I practically never blush.	T	F
12. I am often afraid that I am going to blush.	T	F
13. I have nightmares every few nights.	T	F
14. My hands and feet are usually warm enough.	T	F
15. I seat very easily even on cool days.	T	F
16. When embarrassed I often break out in a sweat that is very annoying.	T	F
17. I do not often notice my heart pounding and I am seldom short of breath.	T	F
18. I feel hungry almost all the time.	T	F
19. I have a great deal of stomach trouble.	T	F
20. At times I lost sleep over worry.	T	F

21. My sleep is restless and disturbed. T F

22. I often dream about things I don't like to tell other people. T F

23. I am easily embarrassed. T F

24. My feelings are hurt more easily than most people. T F

25. I often find myself worrying about something. T F

26. I wish I could be as happy as others. T F

27. I am usually calm and not easily upset. T F

28. I cry easily. T F

29. I feel anxious about something or someone almost all of the time. T F

30. I am happy most of the time. T F

31. It makes me nervous to have to wait. T F

32. Sometimes I become so excited that I find it hard to get to sleep. T F

33. I have often felt that I faced so many difficulties I could not overcome them. T F

34. At times I have been worried beyond reason about something that really did not matter T F

35. I do not have as many fears as my friends. T F

36. I have been afraid of things or people that I know could not hurt me. T F

37. I certainly feel useless at times. T F

38. I find it hard to keep my mind on a task or job. T F

39. I am more self-conscious than most people. T F

40. I am the kind of person who takes things hard. T F

41. I am a very nervous person. T F

42. Life is often a strain for me. T F

43. I am not at all confident of myself. T F

44. I don’t like to face a difficulty or make an important decision. T F

45. I am very confident of myself. T F

46. At times I am so restless that I cannot sit in a chair for very long. T F

Photographic Preference

Directions: You are about to view 90 photographs of different landscapes. A new photo will automatically appear on the computer screen every eight seconds. After each photo, please rate how attractive or beautiful it is using the scales provided below. Circle '+4' if the environment is one of the most beautiful and attractive environments you have ever seen. Circle '-4' if the environment is one of the ugliest, most repulsive environments you have ever seen. If you feel you need more time to look at a photo and/or to make your rating, you can pause the slideshow by pressing the back arrow once. To resume the slideshow, press the forward arrow.

1. Extremely ugly, repulsive -4 -3 -2 -1 Neutral; neither attractive nor ugly 0 +1 +2 +3 +4 Extremely beautiful, attractive
2. Extremely ugly, repulsive -4 -3 -2 -1 Neutral; neither attractive nor ugly 0 +1 +2 +3 +4 Extremely beautiful, attractive
3. Extremely ugly, repulsive -4 -3 -2 -1 Neutral; neither attractive nor ugly 0 +1 +2 +3 +4 Extremely beautiful, attractive
4. Extremely ugly, repulsive -4 -3 -2 -1 Neutral; neither attractive nor ugly 0 +1 +2 +3 +4 Extremely beautiful, attractive
5. Extremely ugly, repulsive -4 -3 -2 -1 Neutral; neither attractive nor ugly 0 +1 +2 +3 +4 Extremely beautiful, attractive
6. Extremely ugly, repulsive -4 -3 -2 -1 Neutral; neither attractive nor ugly 0 +1 +2 +3 +4 Extremely beautiful, attractive
7. Extremely ugly, repulsive -4 -3 -2 -1 Neutral; neither attractive nor ugly 0 +1 +2 +3 +4 Extremely beautiful, attractive
8. Extremely ugly, repulsive -4 -3 -2 -1 Neutral; neither attractive nor ugly 0 +1 +2 +3 +4 Extremely beautiful, attractive
9. Extremely ugly, repulsive -4 -3 -2 -1 Neutral; neither attractive nor ugly 0 +1 +2 +3 +4 Extremely beautiful, attractive

10. Extremely ugly, repulsive	-4	-3	-2	-1	0 Neutral; neither attractive nor ugly	+1	+2	+3	+4 Extremely beautiful, attractive
11. Extremely ugly, repulsive	-4	-3	-2	-1	0 Neutral; neither attractive nor ugly	+1	+2	+3	+4 Extremely beautiful, attractive
12. Extremely ugly, repulsive	-4	-3	-2	-1	0 Neutral; neither attractive nor ugly	+1	+2	+3	+4 Extremely beautiful, attractive
13. Extremely ugly, repulsive	-4	-3	-2	-1	0 Neutral; neither attractive nor ugly	+1	+2	+3	+4 Extremely beautiful, attractive
14. Extremely ugly, repulsive	-4	-3	-2	-1	0 Neutral; neither attractive nor ugly	+1	+2	+3	+4 Extremely beautiful, attractive
15. Extremely ugly, repulsive	-4	-3	-2	-1	0 Neutral; neither attractive nor ugly	+1	+2	+3	+4 Extremely beautiful, attractive
16. Extremely ugly, repulsive	-4	-3	-2	-1	0 Neutral; neither attractive nor ugly	+1	+2	+3	+4 Extremely beautiful, attractive
17. Extremely ugly, repulsive	-4	-3	-2	-1	0 Neutral; neither attractive nor ugly	+1	+2	+3	+4 Extremely beautiful, attractive
18. Extremely ugly, repulsive	-4	-3	-2	-1	0 Neutral; neither attractive nor ugly	+1	+2	+3	+4 Extremely beautiful, attractive
19. Extremely ugly, repulsive	-4	-3	-2	-1	0 Neutral; neither attractive nor ugly	+1	+2	+3	+4 Extremely beautiful, attractive
20. Extremely ugly, repulsive	-4	-3	-2	-1	0 Neutral; neither attractive nor ugly	+1	+2	+3	+4 Extremely beautiful, attractive

21. Extremely ugly, repulsive	-4	-3	-2	-1	0 Neutral; neither attractive nor ugly	+1	+2	+3	+4 Extremely beautiful, attractive
22. Extremely ugly, repulsive	-4	-3	-2	-1	0 Neutral; neither attractive nor ugly	+1	+2	+3	+4 Extremely beautiful, attractive
23. Extremely ugly, repulsive	-4	-3	-2	-1	0 Neutral; neither attractive nor ugly	+1	+2	+3	+4 Extremely beautiful, attractive
24. Extremely ugly, repulsive	-4	-3	-2	-1	0 Neutral; neither attractive nor ugly	+1	+2	+3	+4 Extremely beautiful, attractive
25. Extremely ugly, repulsive	-4	-3	-2	-1	0 Neutral; neither attractive nor ugly	+1	+2	+3	+4 Extremely beautiful, attractive
26. Extremely ugly, repulsive	-4	-3	-2	-1	0 Neutral; neither attractive nor ugly	+1	+2	+3	+4 Extremely beautiful, attractive
27. Extremely ugly, repulsive	-4	-3	-2	-1	0 Neutral; neither attractive nor ugly	+1	+2	+3	+4 Extremely beautiful, attractive
28. Extremely ugly, repulsive	-4	-3	-2	-1	0 Neutral; neither attractive nor ugly	+1	+2	+3	+4 Extremely beautiful, attractive
29. Extremely ugly, repulsive	-4	-3	-2	-1	0 Neutral; neither attractive nor ugly	+1	+2	+3	+4 Extremely beautiful, attractive
30. Extremely ugly, repulsive	-4	-3	-2	-1	0 Neutral; neither attractive nor ugly	+1	+2	+3	+4 Extremely beautiful, attractive
31. Extremely ugly, repulsive	-4	-3	-2	-1	0 Neutral; neither attractive nor ugly	+1	+2	+3	+4 Extremely beautiful, attractive

32.	Extremely ugly, repulsive	-4	-3	-2	-1	0 Neutral; neither attractive nor ugly	+1	+2	+3	+4 Extremely beautiful, attractive
33.	Extremely ugly, repulsive	-4	-3	-2	-1	0 Neutral; neither attractive nor ugly	+1	+2	+3	+4 Extremely beautiful, attractive
34.	Extremely ugly, repulsive	-4	-3	-2	-1	0 Neutral; neither attractive nor ugly	+1	+2	+3	+4 Extremely beautiful, attractive
35.	Extremely ugly, repulsive	-4	-3	-2	-1	0 Neutral; neither attractive nor ugly	+1	+2	+3	+4 Extremely beautiful, attractive
36.	Extremely ugly, repulsive	-4	-3	-2	-1	0 Neutral; neither attractive nor ugly	+1	+2	+3	+4 Extremely beautiful, attractive
37.	Extremely ugly, repulsive	-4	-3	-2	-1	0 Neutral; neither attractive nor ugly	+1	+2	+3	+4 Extremely beautiful, attractive
38.	Extremely ugly, repulsive	-4	-3	-2	-1	0 Neutral; neither attractive nor ugly	+1	+2	+3	+4 Extremely beautiful, attractive
39.	Extremely ugly, repulsive	-4	-3	-2	-1	0 Neutral; neither attractive nor ugly	+1	+2	+3	+4 Extremely beautiful, attractive
40.	Extremely ugly, repulsive	-4	-3	-2	-1	0 Neutral; neither attractive nor ugly	+1	+2	+3	+4 Extremely beautiful, attractive
41.	Extremely ugly, repulsive	-4	-3	-2	-1	0 Neutral; neither attractive nor ugly	+1	+2	+3	+4 Extremely beautiful, attractive
42.	Extremely ugly, repulsive	-4	-3	-2	-1	0 Neutral; neither attractive nor ugly	+1	+2	+3	+4 Extremely beautiful, attractive

43. Extremely ugly, repulsive	-4	-3	-2	-1	0 Neutral; neither attractive nor ugly	+1	+2	+3	+4 Extremely beautiful, attractive
44. Extremely ugly, repulsive	-4	-3	-2	-1	0 Neutral; neither attractive nor ugly	+1	+2	+3	+4 Extremely beautiful, attractive
45. Extremely ugly, repulsive	-4	-3	-2	-1	0 Neutral; neither attractive nor ugly	+1	+2	+3	+4 Extremely beautiful, attractive
46. Extremely ugly, repulsive	-4	-3	-2	-1	0 Neutral; neither attractive nor ugly	+1	+2	+3	+4 Extremely beautiful, attractive
47. Extremely ugly, repulsive	-4	-3	-2	-1	0 Neutral; neither attractive nor ugly	+1	+2	+3	+4 Extremely beautiful, attractive
48. Extremely ugly, repulsive	-4	-3	-2	-1	0 Neutral; neither attractive nor ugly	+1	+2	+3	+4 Extremely beautiful, attractive
49. Extremely ugly, repulsive	-4	-3	-2	-1	0 Neutral; neither attractive nor ugly	+1	+2	+3	+4 Extremely beautiful, attractive
50. Extremely ugly, repulsive	-4	-3	-2	-1	0 Neutral; neither attractive nor ugly	+1	+2	+3	+4 Extremely beautiful, attractive
51. Extremely ugly, repulsive	-4	-3	-2	-1	0 Neutral; neither attractive nor ugly	+1	+2	+3	+4 Extremely beautiful, attractive
52. Extremely ugly, repulsive	-4	-3	-2	-1	0 Neutral; neither attractive nor ugly	+1	+2	+3	+4 Extremely beautiful, attractive
53. Extremely ugly, repulsive	-4	-3	-2	-1	0 Neutral; neither attractive nor ugly	+1	+2	+3	+4 Extremely beautiful, attractive

54.	Extremely ugly, repulsive	-4	-3	-2	-1	0 Neutral; neither attractive nor ugly	+1	+2	+3	+4 Extremely beautiful, attractive
55.	Extremely ugly, repulsive	-4	-3	-2	-1	0 Neutral; neither attractive nor ugly	+1	+2	+3	+4 Extremely beautiful, attractive
56.	Extremely ugly, repulsive	-4	-3	-2	-1	0 Neutral; neither attractive nor ugly	+1	+2	+3	+4 Extremely beautiful, attractive
57.	Extremely ugly, repulsive	-4	-3	-2	-1	0 Neutral; neither attractive nor ugly	+1	+2	+3	+4 Extremely beautiful, attractive
58.	Extremely ugly, repulsive	-4	-3	-2	-1	0 Neutral; neither attractive nor ugly	+1	+2	+3	+4 Extremely beautiful, attractive
59.	Extremely ugly, repulsive	-4	-3	-2	-1	0 Neutral; neither attractive nor ugly	+1	+2	+3	+4 Extremely beautiful, attractive
60.	Extremely ugly, repulsive	-4	-3	-2	-1	0 Neutral; neither attractive nor ugly	+1	+2	+3	+4 Extremely beautiful, attractive
61.	Extremely ugly, repulsive	-4	-3	-2	-1	0 Neutral; neither attractive nor ugly	+1	+2	+3	+4 Extremely beautiful, attractive
62.	Extremely ugly, repulsive	-4	-3	-2	-1	0 Neutral; neither attractive nor ugly	+1	+2	+3	+4 Extremely beautiful, attractive
63.	Extremely ugly, repulsive	-4	-3	-2	-1	0 Neutral; neither attractive nor ugly	+1	+2	+3	+4 Extremely beautiful, attractive
64.	Extremely ugly, repulsive	-4	-3	-2	-1	0 Neutral; neither attractive nor ugly	+1	+2	+3	+4 Extremely beautiful, attractive

65.	Extremely ugly, repulsive	-4	-3	-2	-1 0 +1 Neutral; neither attractive nor ugly			+2	+3	+4 Extremely beautiful, attractive
66.	Extremely ugly, repulsive	-4	-3	-2	-1 0 +1 Neutral; neither attractive nor ugly			+2	+3	+4 Extremely beautiful, attractive
67.	Extremely ugly, repulsive	-4	-3	-2	-1 0 +1 Neutral; neither attractive nor ugly			+2	+3	+4 Extremely beautiful, attractive
68.	Extremely ugly, repulsive	-4	-3	-2	-1 0 +1 Neutral; neither attractive nor ugly			+2	+3	+4 Extremely beautiful, attractive
69.	Extremely ugly, repulsive	-4	-3	-2	-1 0 +1 Neutral; neither attractive nor ugly			+2	+3	+4 Extremely beautiful, attractive
70.	Extremely ugly, repulsive	-4	-3	-2	-1 0 +1 Neutral; neither attractive nor ugly			+2	+3	+4 Extremely beautiful, attractive
71.	Extremely ugly, repulsive	-4	-3	-2	-1 0 +1 Neutral; neither attractive nor ugly			+2	+3	+4 Extremely beautiful, attractive
72.	Extremely ugly, repulsive	-4	-3	-2	-1 0 +1 Neutral; neither attractive nor ugly			+2	+3	+4 Extremely beautiful, attractive
73.	Extremely ugly, repulsive	-4	-3	-2	-1 0 +1 Neutral; neither attractive nor ugly			+2	+3	+4 Extremely beautiful, attractive
74.	Extremely ugly, repulsive	-4	-3	-2	-1 0 +1 Neutral; neither attractive nor ugly			+2	+3	+4 Extremely beautiful, attractive
75.	Extremely ugly, repulsive	-4	-3	-2	-1 0 +1 Neutral; neither attractive nor ugly			+2	+3	+4 Extremely beautiful, attractive

76. Extremely ugly, repulsive -4 -3 -2 -1 0 +1 +2 +3 +4 Extremely beautiful, attractive
Neutral; neither attractive nor ugly

77. Extremely ugly, repulsive -4 -3 -2 -1 0 +1 +2 +3 +4 Extremely beautiful, attractive
Neutral; neither attractive nor ugly

78. Extremely ugly, repulsive -4 -3 -2 -1 0 +1 +2 +3 +4 Extremely beautiful, attractive
Neutral; neither attractive nor ugly

79. Extremely ugly, repulsive -4 -3 -2 -1 0 +1 +2 +3 +4 Extremely beautiful, attractive
Neutral; neither attractive nor ugly

80. Extremely ugly, repulsive -4 -3 -2 -1 0 +1 +2 +3 +4 Extremely beautiful, attractive
Neutral; neither attractive nor ugly

81. Extremely ugly, repulsive -4 -3 -2 -1 0 +1 +2 +3 +4 Extremely beautiful, attractive
Neutral; neither attractive nor ugly

82. Extremely ugly, repulsive -4 -3 -2 -1 0 +1 +2 +3 +4 Extremely beautiful, attractive
Neutral; neither attractive nor ugly

83. Extremely ugly, repulsive -4 -3 -2 -1 0 +1 +2 +3 +4 Extremely beautiful, attractive
Neutral; neither attractive nor ugly

84. Extremely ugly, repulsive -4 -3 -2 -1 0 +1 +2 +3 +4 Extremely beautiful, attractive
Neutral; neither attractive nor ugly

85. Extremely ugly, repulsive -4 -3 -2 -1 0 +1 +2 +3 +4 Extremely beautiful, attractive
Neutral; neither attractive nor ugly

86. Extremely ugly, repulsive -4 -3 -2 -1 0 +1 +2 +3 +4 Extremely beautiful, attractive
Neutral; neither attractive nor ugly

87.	Extremely ugly, repulsive	-4	-3	-2	-1	0 Neutral; neither attractive nor ugly	+1	+2	+3	+4 Extremely beautiful, attractive
88.	Extremely ugly, repulsive	-4	-3	-2	-1	0 Neutral; neither attractive nor ugly	+1	+2	+3	+4 Extremely beautiful, attractive
89.	Extremely ugly, repulsive	-4	-3	-2	-1	0 Neutral; neither attractive nor ugly	+1	+2	+3	+4 Extremely beautiful, attractive
90.	Extremely ugly, repulsive	-4	-3	-2	-1	0 Neutral; neither attractive nor ugly	+1	+2	+3	+4 Extremely beautiful, attractive

Sensation Seeking

Interests and Preferences

Directions: Each of the items below contains two choices, A and B. Please indicate which of the choices most describes your likes or the way you feel. In some cases you may find items in which both choices describe your likes or feelings. Please choose the one which better describes your likes or feelings. In some cases you may find items in which you do not like either choice. In these cases mark the choice you dislike least. Do not leave any items blank. It is important you respond to all items with only one choice, A or B. We are interested only in your likes or feelings, not in how others feel about these things or how one is supposed to feel. There are no right or wrong answers as in other kinds of tests. Be frank and give your honest appraisal of yourself.

1. A. I like "wild" parties.
   B. I prefer quiet parties with good conversation.
2. A. There are some movies I enjoy seeing a second or even a third time.
   B. I can't stand watching a movie that I've seen before.
3. A. I often wish I could be a mountain climber.
   B. I can't understand people who risk their necks climbing mountains.
4. A. I dislike all body odors.
   B. I like some of the earth body smells.
5. A. I get bored seeing the same old faces.
   B. I like the comfortable familiarity of everyday friends.
6. A. I like to explore a strange city or section of town by myself, even if it means getting lost.
   B. I prefer a guide when I am in a place I don't know well.
7. A. I dislike people who do or say things just to shock or upset others.
   B. When you can predict almost everything a person will do and say he or she must be a bore.
8. A. I usually don't enjoy a movie or play where I can predict what will happen in advance.
   B. I don't mind watching a move or play where I can predict what will happen in advance.
9. A. I have tried marijuana or would like to.
   B. I would never smoke marijuana.
10. A. I would not like to try and drug which might produce strange and dangerous effects on me.
    B. I would like to try some of the drugs that produce hallucinations.
11. A. A sensible person avoids activities that are dangerous.
    B. I sometimes like to do things that are a little frightening.
12. A. I dislike "swingers" (people who are uninhibited about sex).
    B. I enjoy the company of real swingers.
13. A. I find that stimulants make me uncomfortable.
    B. I often like to get high (drinking liquor or smoking marijuana).

14. A. I like to try new foods that I have never tasted before.
    B. I order the dishes with which I am familiar so as to avoid disappointment and unpleasantness.
15. A. I enjoy looking at home movies, videos, or travel slides.
    B. Looking at someone's home movies, videos, or travel slides bores me tremendously.
16. A. I would like to take up the sport of water skiing.
    B. I would not like to take up water skiing.
17. A. I would like to try surfboard riding.
    B. I would not like to try surfboard riding.
18. A. I would like to take off on a trip with no preplanned or definite routes, or timetable.
    B. When I go on a trip I like to plan my route and timetable fairly carefully.
19. A. I prefer the "down to earth" kinds of people as friends.
    B. I would like to make friends in some of the "far-out" groups like artists or "punks".
20. A. I would not like to learn to fly an airplane.
    B. I would like to learn to fly an airplane.
21. A. I prefer the surface of the water to the depths.
    B. I would like to go scuba diving.
22. A. I would like to meet some persons who are homosexual (men or women).
    B. I stay away from anyone I suspect of being gay or lesbian.
23. A. I would like to try parachute jumping.
    B. I would never want to try jumping out of a plane, with or without a parachute.
24. A. I prefer friends who are excitingly unpredictable.
    B. I prefer friends who are reliable and predictable.
25. A. I am not interested in experience for its own sake.
    B. I like to have new and exciting experiences and sensations even if they are a little frightening, unconventional, or illegal.
26. A. The essence of good art is in its clarity, symmetry of form, and harmony of colors.
    B. I often find beauty in the "clashing" colors and irregular forms of modern paintings.
27. A. I enjoy spending time in the familiar surroundings of home.
    B. I get very restless if I have to stay around home for any length of time.
28. A. I like to dive off the high board.
    B. I don't like the feeling I get standing on the high board (or don't go near it at all).
29. A. I like to date persons who are physically exciting.
    B. I like to date persons who share my values.
30. A. Heavy drinking usually ruins a party because some people get loud and boisterous.
    B. Keeping the drinks full is the key to a good party.
31. A. The worst social sin is to be rude.
    B. The worst social sin is to be a bore.
32. A. A person should have considerable sexual experience before marriage.

B. It's better if two married persons begin their sexual experience with each other.

33. A. Even if I had the money, I would not care to associate with flighty rich persons in the "jet set".
    B. I could conceive of myself seeking pleasures around the world with the "jet set".
34. A. I like people who are sharp and witty even if they do sometimes insult others.
    B. I dislike people who have their fun at the expense of hurting the feelings of others.
35. A. There is altogether too much portrayal of sex in movies.
    B. I enjoy watching many of the "sexy" scenes in movies.
36. A. I feel best after taking a couple drinks.
    B. Something is wrong with people who need liquor to feel good.
37. A. People should dress according to some standard of taste, neatness, and style.
    B. People should dress in individual ways even if the effects are sometimes strange.
38. A. Sailing long distances in small sailing crafts is foolhardy.
    B. I would like to sail a long distance in a small but seaworthy sailing craft.
39. A. I have no patience with dull or boring persons.
    B. I find something interesting in almost every person I talk to.
40. A. Skiing down a high mountain slope is a good way to end up on crutches.
    B. I think I would enjoy the sensation of skiing very fast down a high mountain slope.

Home Environment Questionnaire

1. Please select from the list below the environment in which you spent the majority of your life. The categories are broad. Please circle the one that fits best.
    a. Rural

    b. Small town

    c. Suburban

    d. Urban / City

2. Please select the setting below in which you would most like to live in the future and briefly explain why in the space provided.
    a. Rural

    b. Small town

    c. Suburban

    d. Urban / City

_____

_____

_____

_____

3. Please estimate the frequency with which you participate in outdoor activities (e.g., camping, hiking, cross country running or train running, rock climbing, canoeing, sailing, etc.). Please do not include instances in which you have participated in sporting events that take place outside, such as soccer or jogging.
    a. Never

    b. Once or twice in my life

    c. Less than once a year but more than once or twice

    d. Approximately once each year

    e. Two to three times a year

f. Approximately every other month

g. Once a month or more

4. On average, how much do you enjoy these outdoor activities? If you have never participated in such activities, how enjoyable do you imagine they would be?
    a. Terrifying, very uncomfortable, and / or extremely unpleasant

    b. Mildly scary, uncomfortable, and / or unpleasant

    c. Approximately an equal amount of positive and negative feelings and experiences

    d. Enjoyable and pleasant. I like doing these activities.

    e. I find these activities to be exciting and / or very fulfilling and satisfying.

Permission

I now understand the true purpose of the study.

____ I give permission to have my data used in this research project.

____ You may not use the data collected from me. Please destroy all data collected from me immediately.

Signature: _____

Appendix B

Photo Criteria

Criteria for Selecting Natural Photographs

Select photos that contain at least 4 of the following 5 characteristics:

1. Water
2. Relatively even, smooth ground cover
3. Distant views to the horizon
4. At least slight elevation changes
5. Moderately large, green, healthy-looking trees or other vegetation that are spaced so as to allow visual penetration of the scene

Eliminate photos that:

1. Contain fewer than 4 of the above criteria
2. Contain animals or people
3. Contain any indication of human influence, no matter how small
4. Convey a sense of threat or danger

Lastly, all photos must be taken during the day and from a human perspective, that is, as if by someone standing at ground level while taking the photo

Criteria for Selecting Human-Influenced Environments

Do not select photos that contain ANY of the following elements:

1. Cars
2. People
3. Prominent advertisements
4. Decay, refuse, or any other kind of urban blight
5. High-rise buildings or large, multi-story apartment buildings
6. Industrial buildings
7. Anything that conveys threat or danger

Select photos that:

1. Appear to be taken from a human perspective, that is, as if it had been taken by someone who was standing at ground level while taking the photograph
2. Are taken during the daytime

Do not select any photo that does not meet ALL of the above criteria

Appendix C

Sample Photographs

Natural

Mixed

Built

Figure Captions

Figure 1. The savannah hypothesis' predicted relationship between mortality salience and photo category preference.

Figure 2. Terror Management Theory's predicated relationship between mortality salience and photo category preference.

Figure 3. Photo category preference as a function of ethnicity.

Figure 4. Preference as a function of desired future setting.

Figure 5. Photo category preference as a function of frequency of participation in outdoor activities.

Figure 6. Photo category preference as a function of enjoyment of outdoor activities.